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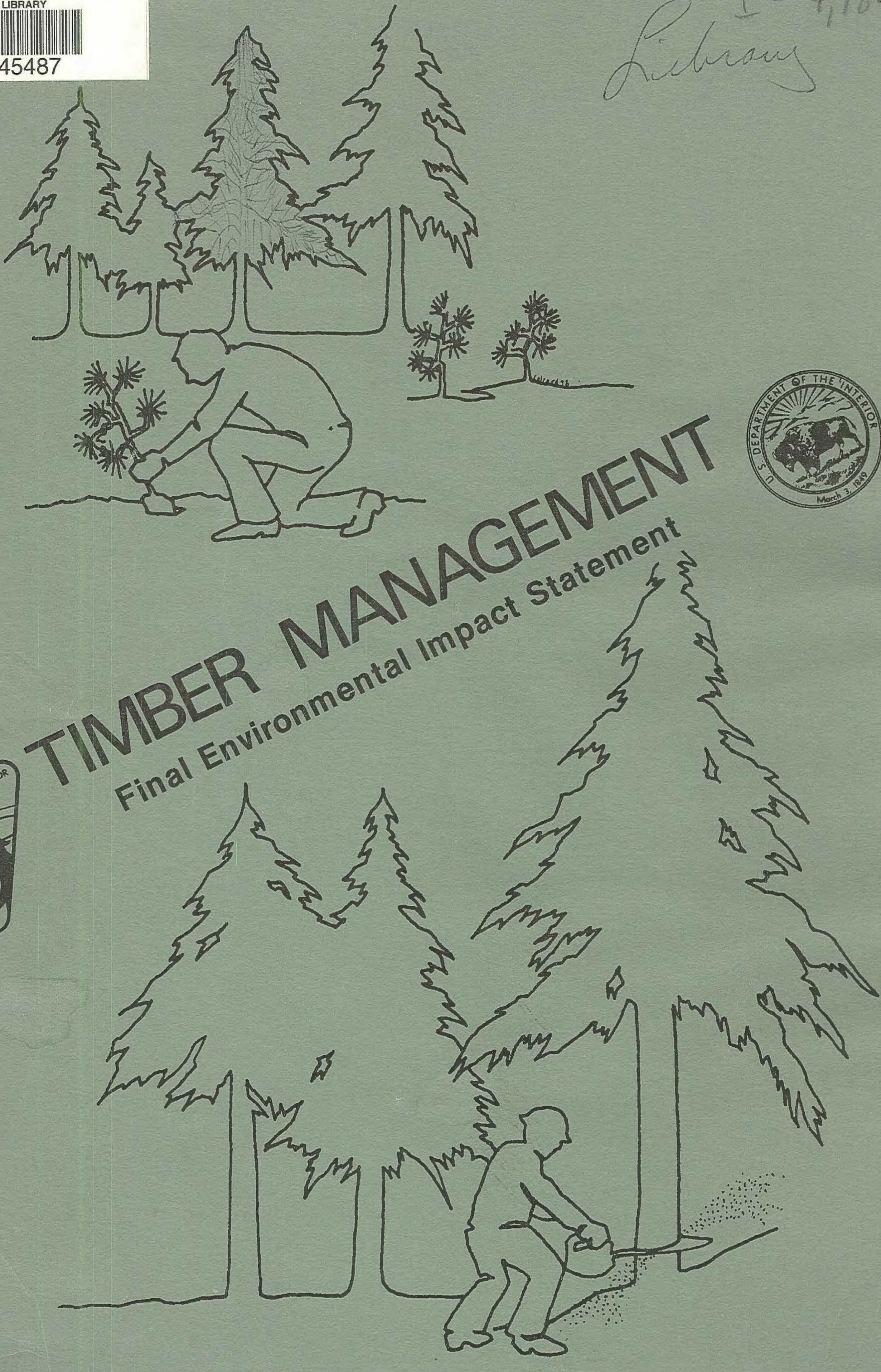

TIMBER MANAGEMENT

Final Environmental Impact Statement

March 3, 1849

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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DEPARTMENT OF THE INTERIOR

FINAL

ENVIRONMENTAL STATEMENT

FOR

TIMBER MANAGEMENT

PREPARED BY

BUREAU OF LAND MANAGEMENT

DEPARTMENT OF THE INTERIOR

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Curt Berklund

Director, Bureau of Land Management

SUMMARY

( ) Draft (x) Final Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action:

   (X) Administrative ( ) Legislative

2. Brief Description of Action:

   This statement addresses itself to the current 10-year timber management program on 22.9 million acres of forest land in the Western United States. No major changes in the current program are proposed. The nature of the timber management program varies between three geographic areas. Only the program thrust of the major area, western Oregon, is described here.

   In western Oregon 1.9 million acres are available for timber production. These lands have an annual allowable cut of 1.172 billion board feet. The program includes the harvest of mature timber, road construction, salvage of dead trees, precommercial thinning of unmarketable trees, commercial thinning of marketable trees, testing of fertilization, site preparation and reforestation, prescribed burning of debris, brush and hardwood control by mechanical and chemical means, protection from insects, disease and fire, conversion of hardwood stands presently occupying conifer sites and the genetic improvement of trees.

3. Summary of Adverse Environmental Effects Following Mitigation:

   a. Aesthetics and Human Interest - Clearcutting, heavy partial cutting, road cuts and fills and occasional massive soil movements will detract from the natural appearance of the forest. The smell, sound, smoke and dust associated with timber operations will have an adverse effect on local air quality near operations and on the senses of most forest visitors. Some archeological sites may not be located or recognized and may be inadvertently destroyed.

   b. Air - Smoke from the prescribed burning of forest debris sometimes constitute a minor temporary nuisance to local human inhabitants. Extensive smoke from any wildfires caused by timber management practices could conceivably result in injuries or deaths.

c. Recreation - Natural waters in timbered areas will be muddied by sediment or invaded by debris carried downslope from logged areas. General recreational use of specific areas will be temporarily disrupted during the period of timber operations.

d. Soil - Localized soil erosion, compaction and occasional mass movement will occur.

e. Vegetation - The natural succession of forest vegetation from pioneer to climax species will be interrupted, and in most instances forestalled.

f. Water - Surface runoff on disturbed areas will accelerate the natural rate of eutrophication of water bodies. Sedimentation, resulting primarily from road construction practices, will temporarily degrade water quality. Water temperatures of small tributary streams will be raised temporarily by forest canopy removal. Any accidental entry of chemical toxicants into water bodies can result in severe degradation of water quality with resultant adverse impacts on aquatic life.

g. Wilderness Experience - Timber management practices will destroy any wilderness or pristine-type areas and their values associated with an undisturbed environment.

h. Wildlife - Short-term disruptions of the aquatic habitat and subsequent death or damage to aquatic, particularly trout fisheries, will occur infrequently. Aquatic wildlife will receive long-term impacts from habitat changes due to stream channel changes, channelization during debris removal and scouring of streambeds from landslides. Some animals will be killed or displaced along with the destruction of their habitat and displacement of wildlife will result in temporary reductions in populations.

i. Minerals - Most forest management practices will benefit minerals, including exploration and development by opening up areas to development.

4. Alternatives Considered:

   a. No timber management program.

   b. Expanded timber management program.

   c. Limited timber management program.

   d. Other timber harvesting practices.

   e. Other domestic sources of timber.

   f. Foreign imports.

   g. Substitute materials.

5. Official Comments Requested from the Following:

Federal Agencies:

*Environmental Protection Agency
*Department of Agriculture
*Department of Health, Education and Welfare
*Department of Transportation
Department of Defense
Department of Commerce
Department of Housing and Urban Development
*Advisory Council on Historic Preservation

Department of the Interior
   *Bureau of Outdoor Recreation
   *National Park Service
   *Bureau of Indian Affairs
   *Bureau of Reclamation
   *Fish and Wildlife Service
   *Geological Survey
   Bureau of Mines

State Agencies:

Department of Conservation, California; Department of Natural Resources and Conservation, Montana; Department of Environmental Quality, Oregon; Oregon State Department of Forestry; State Forestry Division, Wyoming; Department of Natural Resources, Washington; Department of Natural Resources, Alaska; Colorado State Forest Service; and Idaho Department of Public Lands.

6. Date Draft Statement Made Available to CEQ and the Public:

   Draft Statement: March 5, 1975

   Final Statement: Sept 26, 1976 Filed with C.E.Q.

*Comments Received and Attached.

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INTRODUCTION

This environmental impact statement has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969. It is a statement describing and evaluating the current 10-year national timber management program carried out by the Bureau of Land Management on the lands available for timber production under its administration and an analysis of associated environmental impacts.

Scope:

The actions described in this environmental impact statement include all development, protection, harvest and transportation practices carried out in an average year for the purpose of producing raw material to help meet the nation's wood product needs. Certain of these practices, such as road construction or protection, may be utilized by other forest land-use programs; however, they are included and described in the context of timber management since their primary purpose is for the management and protection of the timber resources.

Timber management represents only one component of the Bureau's total forest management effort. This statement does not explicitly address itself to those practices or actions which are carried out for the specific purpose of producing or providing other forest values and uses of the public lands. Recreation, aesthetics, minerals, wildlife, watershed, range and other forest resource values are described only in terms of how they are impacted by timber management practices.

The environmental impact of the off-site processing of the raw material is not discussed. Finally, the statement addresses itself primarily to commercial forest lands available for timber production. This excludes non-commercial forest lands such as pinyon-juniper and other woodland types.*

---

*Refer to glossary.

I. TIMBER MANAGEMENT (PROPOSED ACTION)

A. Description of the Program

The Bureau of Land Management administers approximately 24.1 million acres of commercial forest land (land capable of producing 20 cu. ft. of wood per acre per year) in the western United States, including Alaska as follows:

Acres	Total BLM (mil. acres)	Commercial Forest Lands (mil. acres)	Commercial Forest Lands Available for Timber Production (mil. acres)
W. Oregon	2.4	2.4	1.9
Alaska*	299.1	19.5	19.9
Other	168.5	2.2	1.5
Total	470.0	24.1	22.9

The general location of these lands is shown on Figures I-1 and I-2.

The Bureaus commercial forest lands represent 4.5 percent of the total forest area in the United States and support 88 billion board feet (16' Scribner Log Rule) of merchantable timber or 2 percent of the nation's wood supply. While all 24.1 million acres have the biological potential for producing commercial crops of timber, the current program is essentially restricted to 3.4 million acres due to economic, social and environmental factors. Based on the current 10-year programs the production from these lands is approximately 1.3 billion board feet annually, representing approximately 3 percent of the nation's total annual wood production. (The difference between the Bureau's 2 percent of the nation's wood supply and 3 percent of the nation's wood production is due to the fact that the lands under the Bureau's administration in western Oregon consist of some of the most productive and intensively managed forests in the nation.) The value of the timber sold in 1973 and 1974 was $131 million and $215 million respectively. The value of timber sold in 1975 was $191 million. The cost of carrying out the program is approximately $20 million annually. The Bureau employs approximately 5000 persons including over 350 professional foresters (about 250 in western Oregon). Other expertise includes wildlife and fisheries biologist, archeologists, recreation specialists, soil scientists, geologists and a variety of other professional disciplines. Combined, approximately 15-20 percent of the total work force is directly involved in supporting the Bureau's timber management program.

*Land status/ownership changing rapidly due to land selections made under the Alaska Statehood Act and the Alaska Native Claims Settlement Act.

LAND ADMINISTERED BY THE BUREAU OF LAND MANAGEMENT

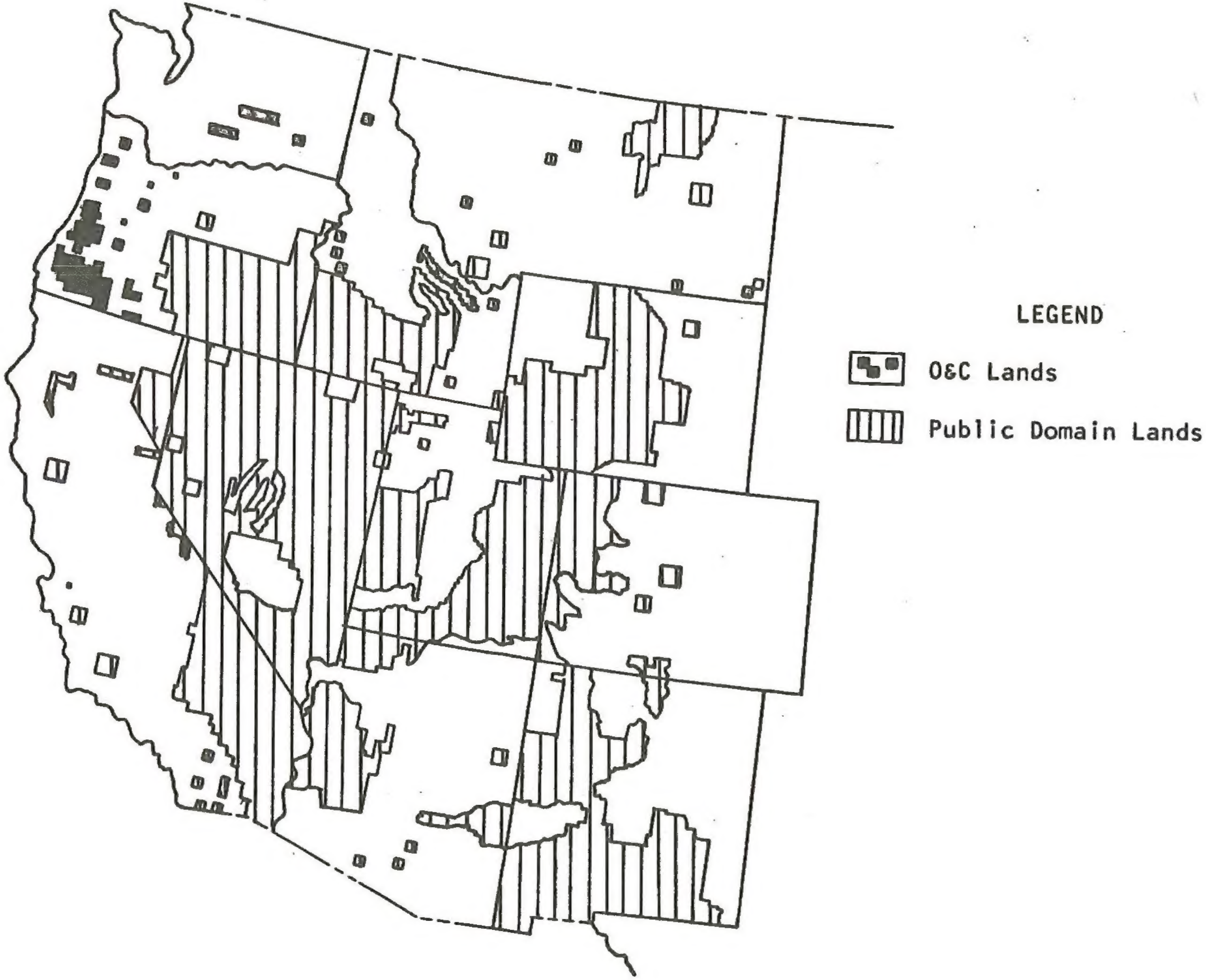


Figure I-1

ALASKAN LANDS ADMINISTERED BY THE BUREAU OF LAND MANAGEMENT

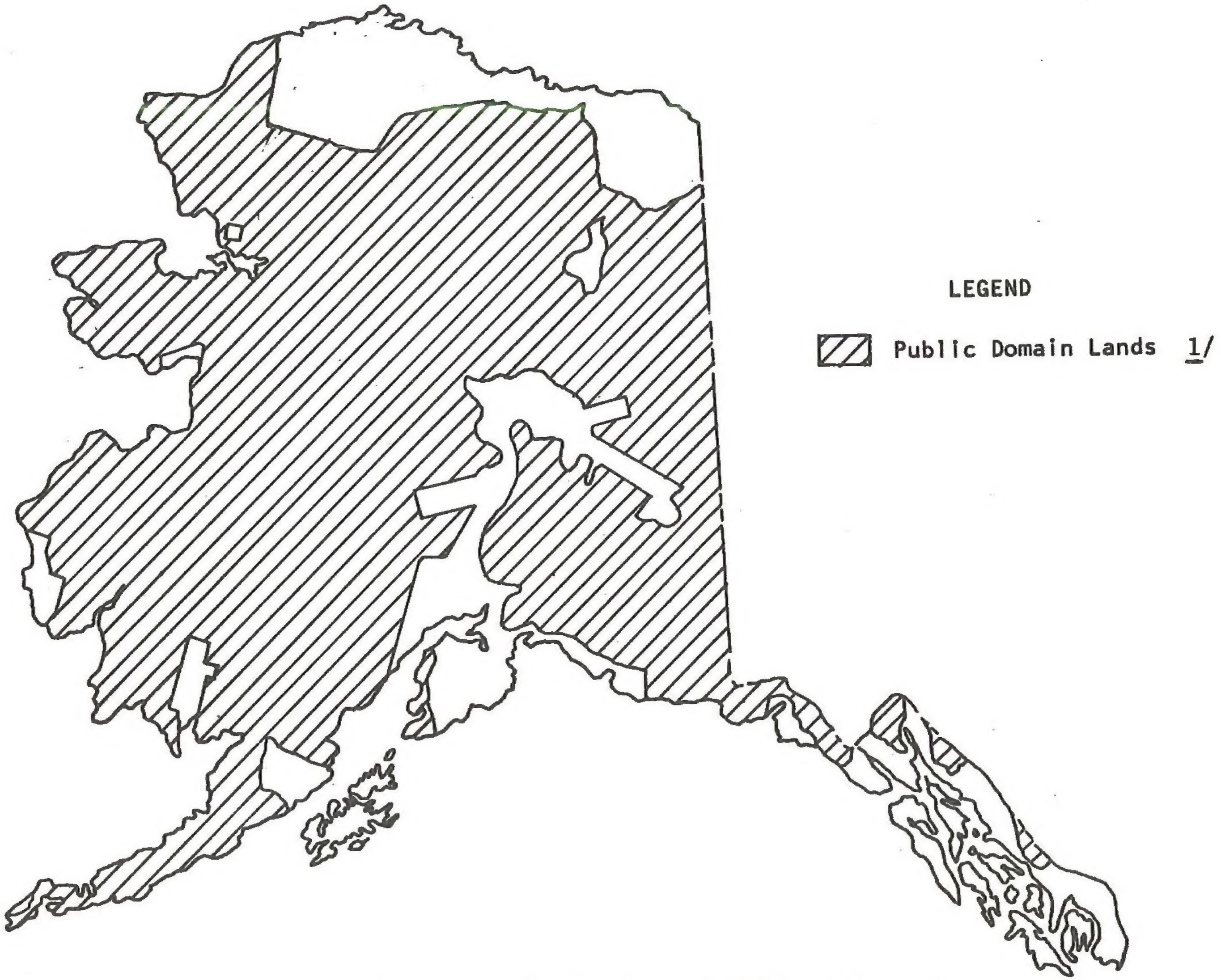


Figure I-2

1/ Under the Alaska Native Claims Settlement Act of 1971, status of lands administered by the Bureau of Land Management are rapidly changing.

The predominant species harvested is Douglas-fir. Other species harvested include, among others, western hemlock, white fir, shasta fir, ponderosa pine, sugar pine, lodgepole pine, Englemann spruce, and western redcedar. Since over half of the forests are composed of overmature trees, the preponderance of the timber harvested is in the form of old growth, i.e., trees 200 years in age and older (Photo I-1). At the current rate of harvest on lands available for timber production, approximately 20 years of cutting remain in the old-growth forests of western Oregon and 40 years in the remaining forests of the contiguous states. No projections are made for Alaska due to land tenure uncertainties.

Clearcutting in patches of 40 acres or less (30-35 acres average) constitutes the major cutting practice in terms of harvest volume. In 1974, 900 million board feet were produced from the clearcutting of 19,800 acres, located primarily in western Oregon. About 70,000 acres (400 million board feet) are partial cut annually in southwestern Oregon and the remaining contiguous states. As the old-growth stands are replaced with young growth, the extent of clearcutting will significantly diminish. During and after this transition, management techniques that maintain a continuous forest-like appearance will be increasingly employed. Cutting practices are discussed more fully in Part E(3)(a) of Chapter I.

The development of the transportation system, one of the major actions associated with timber production, currently involves the construction of about 500 miles of road a year. In western Oregon, this involves approximately 400 miles a year for about 20 years and for the remaining forests, approximately 100 miles per year over a 30-40 year period. Trends toward more far-reaching logging systems can be expected to shorten these periods due to a declining need for an intensive and extensive road network.

In addition to the foregoing activities associated with the harvest of trees, intensive timber management practices are employed to varying degrees on lands presently available for timber production. These silvicultural practices are aimed at the establishment of stands of superior trees, and also provide the treatments necessary to improve productivity through the optimum utilization of growing space. These treatments include tree improvement, site preparation, seeding, planting, brush and hardwood control, precommercial thinning, commercial thinning, mortality salvage and other capital investments carried out for the primary purpose of increasing wood-growth and, in turn, production. In actual practice, not all of these practices are applied to a given area since many represent alternative methods, the choice of which is dependent primarily upon the conditions that characterize the site or stand. Furthermore, some practices are not carried out at all on given areas because of technical, economic and environmental constraints. Due to these factors and the preponderance of overmature stands, only 450,000 acres or 11 percent (none of which are in Alaska) of the total 3.4 million acres in the current production base will be subjected to intensive management practices during the program period based on existing plans.

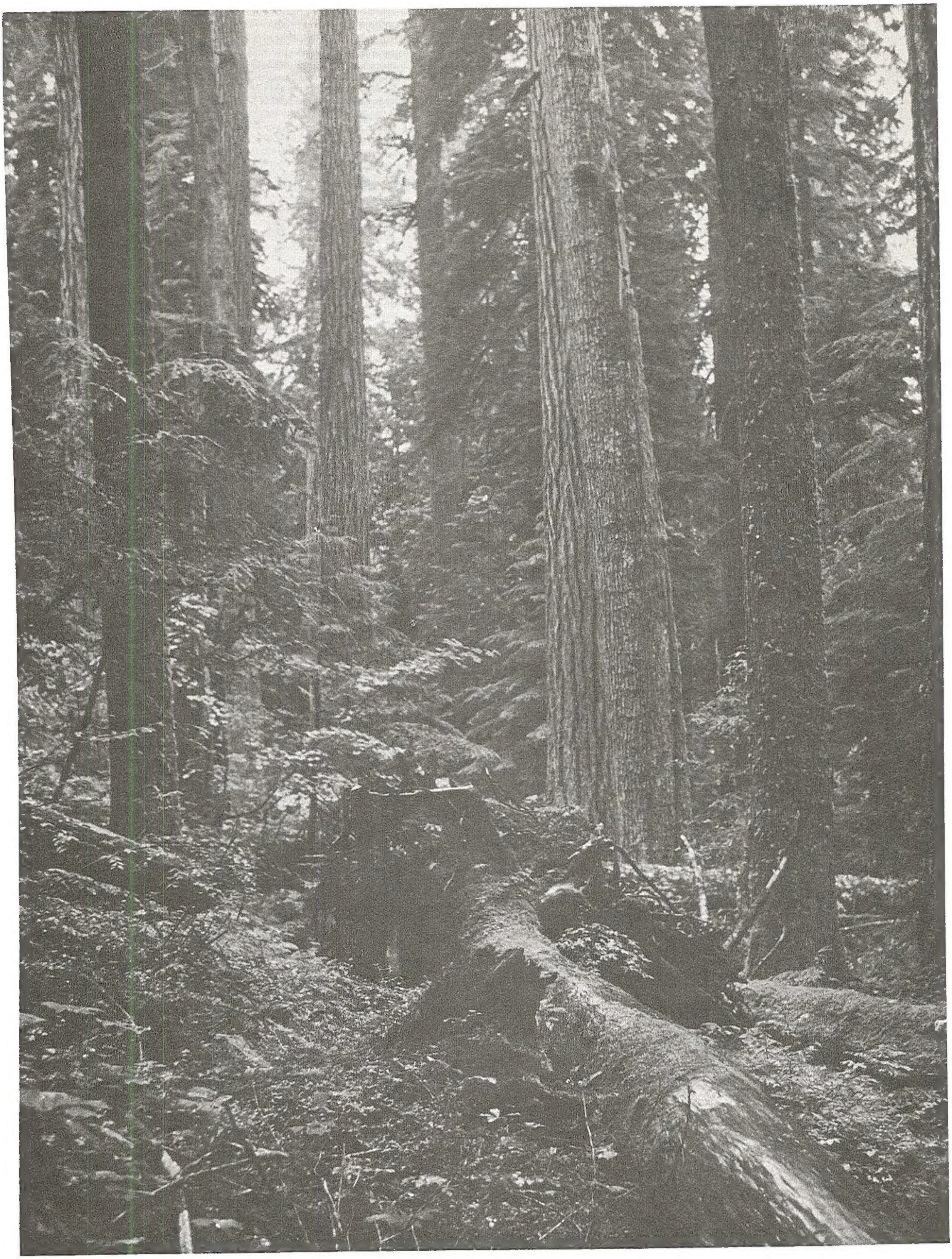


PHOTO I-1: Old-growth forest. The preponderance of the timber harvested from Bureau lands is in the form of old-growth trees (200 years in age and older). Douglas-fir is the principle species harvested.

An integral part of the timber management program is the protection of all forests from insects disease and fire. The magnitude and nature of this program element is not readily predictable and will vary yearly since it is dependent upon the extent of the areas affected and the causative agents. The predominant control measure is prevention by cutting dead, dying and infected trees during normal harvesting operations along with the development of disease-resistant trees. Direct control measures include fire suppression activities and the use of chemicals to combat insect infestations. However, at this time no projects using chemicals to control insect or disease infestations are planned.

B. Forest Management Authorities, Objectives and Policies

The timber management program is only one component of the forest management program which is carried out in accordance with the laws, statutes, and regulations pertaining to the lands under the administration of the Bureau of Land Management. The basic guidance set forth in these authorities requires that forest lands be managed under the principles of multiple use, sustained-yield and environmental quality. Forest management is defined so as to include the management of the land along with the wildlife, water, minerals, timber, recreation, forage and other resource values associated with it. The principal authorities relating to the management of forest resources are:

Basic Authorities Relating to Land Management and *Resource Disposal

- O&C Act of 1937
- Materials Sales Act of 1947
- Act of 1898
- Act of 1926
- Public Land Administration Act of 1960
- Taylor Grazing Act of 1934

Basic Authorities Relating (Primarily) To Protection and Development of Resources

- Federal Water Pollution Control Act
- Clean Air Act
- Fish and Wildlife Coordination Act
- Bald Eagle Protection Act
- Federal Environmental Pesticide Control Act
- Threatened and Endangered Species Act
- Coastal Zone Management Act
- Sikes Act
- National Environmental Policy Act
- National Historic Preservation Act
- Historic Sites Act
- Federal Safe Water Drinking Act
- Noise Control Act
- Solid Waste Disposal Act
- Antiquities Act
- Executive Order 11593
- Wild Free-Roaming Horse and Burro Act

* Laws pertaining to minerals disposal excluded.

In the hierarchy of objective and policy levels, these basic authorities and the principles included therein take precedence over specific timber-production-oriented objectives and policies and, in turn, provide the framework within which the timber management program is developed.

While the Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road Grant Lands Act of 1937 applies only to the revested and reconveyed lands under the Bureau's administration in western Oregon, it typifies the intent of corollary federal legislation in stating that forest lands, "shall be managed . . . for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream-flow . . . and providing recreation facilities." (This act, attached as Appendix C, was considered to be the first law which provided specifically for multiple-use and sustained-yield management of federal lands.) It was later joined by the now expired Classification and Multiple Use Act of 1964 which extended these principles to the remainder of the Bureau-administered forest lands. The environmental considerations required under both of these acts were made explicit and a procedural process for their evaluation set forth with the passage of the National Environmental Policy Act of 1969.

The three basic principles of multiple-use, sustained-yield, and environmental quality are embodied in the following listing of the major objectives and policies that guide the Bureau's forest management program.

- That forest lands provide a balance of resource goods and services as determined by national goals and priorities in order to meet the economic and social needs of the public, both now and in the future.

- That land-use conflicts, when they exist, be reconciled to the extent possible through appropriate management practices. If unreconcilable, that the land be classified for a single use or combination of uses in consideration of local, state, or national priorities. Land-use decisions made in such situations should be made in the context of carrying capacities and environmental protection.

- That lands be managed so as to achieve a high level or regular periodic output of the various resources without impairment of their inherent productivity or quality.

- That lands be protected so as to minimize losses or damage to the forest resources as a result of fire, insects and disease.

- That land-use be managed so as to encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment; and to stimulate the health and welfare of man.

The achievement of these objectives and policies requires the forest management program to be representative of a coordinated, multi-resource plan that is based on technical, social, economic and environmental criteria. As such, its formulation and implementation involve the utilization of expertise relating to the biological, social and economic arts or sciences. Additionally, public input and review are solicited during the planning and subsequent stages in order for the Bureau to be more effective in responding to the national interest.

C. Forest Land-Use Planning Procedures

A timber management program (activity plan and timber sale) for a given forest is the outgrowth of a process known as the Bureau Planning System. The purposes of the Bureau Planning System are to:

- Permit informed and objective multiple-use decisions through the identification and reconciliation of conflicting land and resource uses in advance of on-the-ground action.

- Help insure that land and resource use, development and management plans and program decisions are responsive to Congressional, Departmental, and Bureau objectives.

The Bureau Planning System is designed to be used in the preparation and maintenance of land-use plans (multiple use) for national resource land (NRL) under BLM administration. These plans, called Management Framework Plans (MFP's), establish coordination between the seven basic resource values or activities for which NRL are managed. These activities include minerals, wildlife habitat, livestock forage, watershed, timber, recreation and intensive land use (e.g., rights-of-way, urban commercial, etc.).

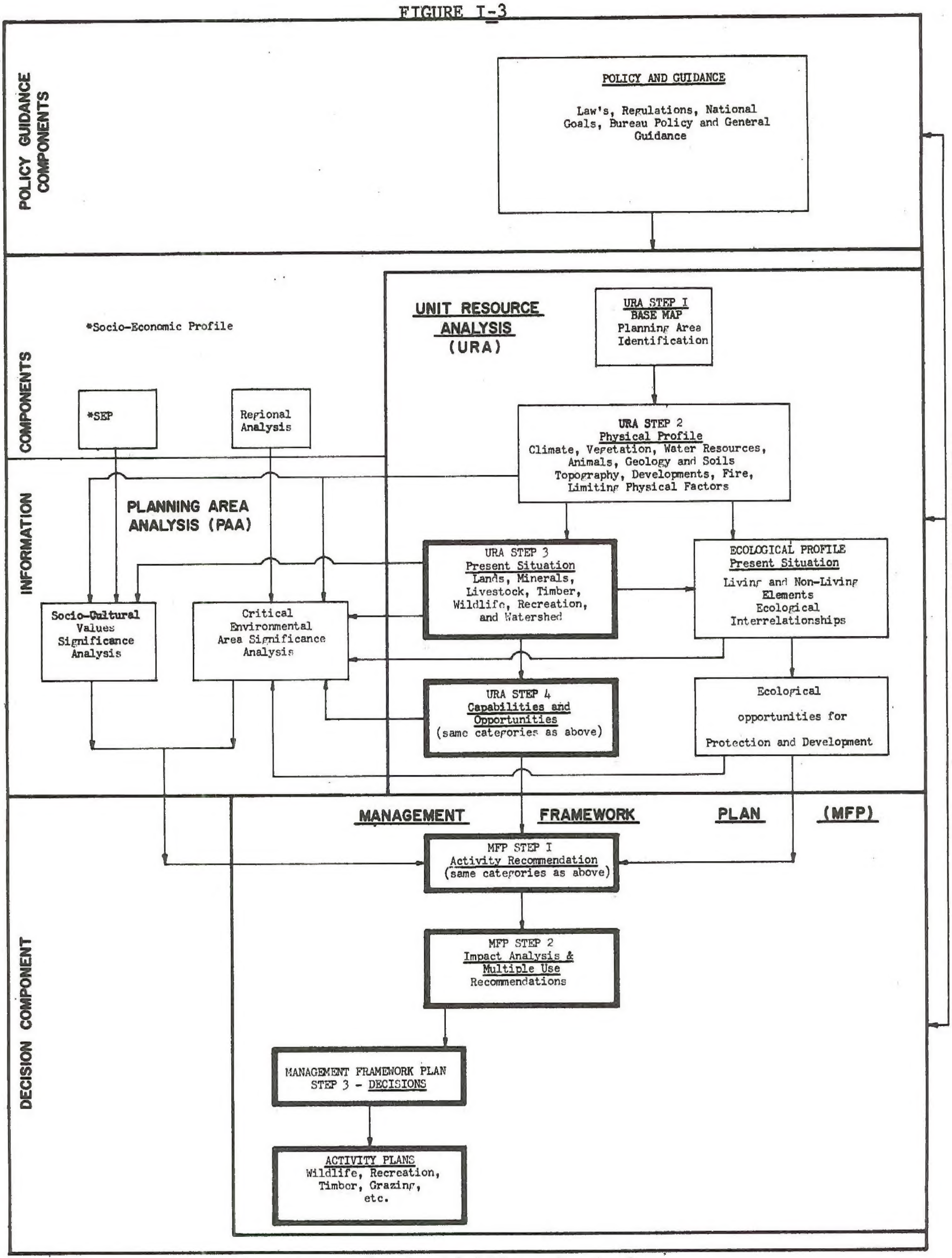
Management Framework Plans are prepared and maintained by an interdisciplinary staff in the 12 BLM state offices and 65 BLM districts and are being recorded for approximately 650 planning units. The system was first started in 1969 and, as of the end of fiscal year 1974, about 1/2 of the public lands under BLM management had been included in first generation plans, including all 13 sustained-yield units of western Oregon.

The system includes a set of component parts designed to meet specific purposes. These component parts are described below in accordance with their function (policy guidance, information and planning decisions). Components are graphically displayed in Figures I-3 and I-3a.

BUREAU PLANNING SYSTEM

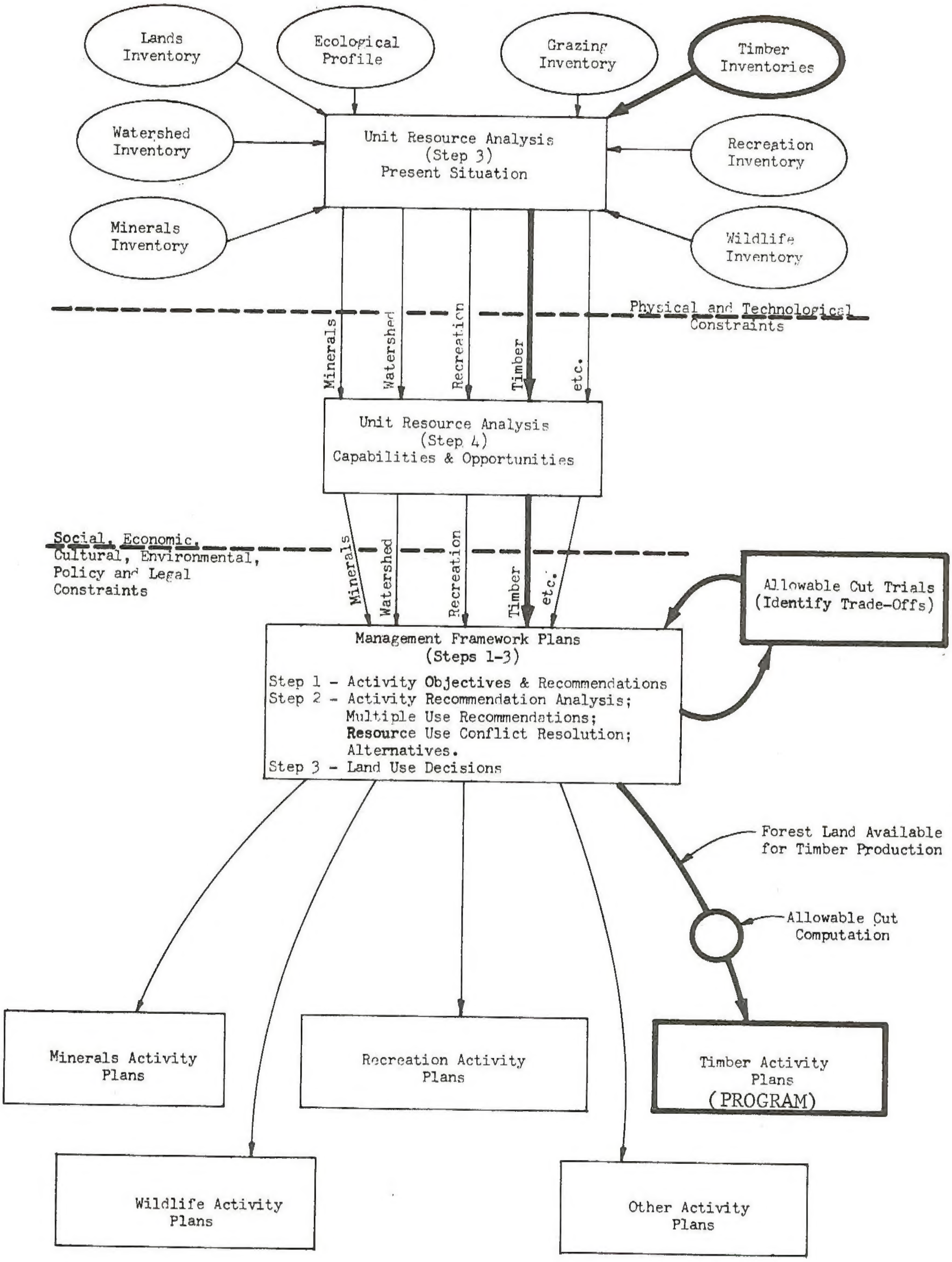
Functional Components

FIGURE I-3


POLICY GUIDANCE COMPONENTS
POLICY AND GUIDANCE
Law's, Regulations, National Goals, Bureau Policy and General Guidance
INFORMATION COMPONENTS
*Socio-Economic Profile
*SEP
Regional Analysis
PLANNING AREA ANALYSIS (PAA)
UNIT RESOURCE ANALYSIS (URA)
URA STEP I
BASE MAP
Planning Area Identification
URA STEP 2
Physical Profile
Climate, Vegetation, Water Resources, Animals, Geology and Soils Topography, Developments, Fire, Limiting Physical Factors
URA STEP 3
Present Situation
Lands, Minerals, Livestock, Timber, Wildlife, Recreation, and Watershed
ECOLOGICAL PROFILE
Present Situation
Living and Non-Living Elements
Ecological Interrelationships
Socio-Cultural Values Significance Analysis
Critical Environmental Area Significance Analysis
URA STEP 4
Capabilities and Opportunities
(same categories as above)
Ecological opportunities for Protection and Development
PUBLIC PARTICIPATION
DECISION COMPONENT
MANAGEMENT FRAMEWORK PLAN (MFP)
MFP STEP I
Activity Recommendation
(same categories as above)
MFP STEP 2
Impact Analysis &
Multiple Use
Recommendations
MANAGEMENT FRAMEWORK PLAN
STEP 3 - DECISIONS
ACTIVITY PLANS
Wildlife, Recreation, Timber, Grazing, etc.

(see figure 11, highlighted areas)

KEY RELATIONSHIP
OF
TIMBER AND TIMBER MANAGEMENT PROGRAM
TO
OTHER RESOURCES AND RESOURCE ACTIVITY PROGRAMS
WITHIN THE BUREAU PLANNING SYSTEM


Lands Inventory
Ecological Profile
Grazing Inventory
Timber Inventories
Watershed Inventory
Unit Resource Analysis (Step 3) Present Situation
Recreation Inventory
Minerals Inventory
Wildlife Inventory
Physical and Technological Constraints
Minerals
Watershed
Recreation
Timber
etc.
Unit Resource Analysis (Step 4) Capabilities & Opportunities
Social, Economic, Cultural, Environmental, Policy and Legal Constraints
Minerals
Watershed
Recreation
Timber
etc.
Allowable Cut Trials (Identify Trade-Offs)
Management Framework Plans (Steps 1-3)
Step 1 - Activity Objectives & Recommendations
Step 2 - Activity Recommendation Analysis; Multiple Use Recommendations; Resource Use Conflict Resolution; Alternatives.
Step 3 - Land Use Decisions
Forest Land Available for Timber Production
Allowable Cut Computation
Minerals Activity Plans
Recreation Activity Plans
Timber Activity Plans (PROGRAM)
Wildlife Activity Plans
Other Activity Plans

/1 Refer to figure I-11

FIGURE I-2a

Policy Guidance Components

Provides basic objectives and policies for national resource activity, including a statement for timber resources. Policy guidance components are provided by laws, secretarial regulations, Departmental and Bureau Manual guidance.

Information Components

Resource Inventory (Unit Resource Analyses). These are maintained for each planning unit. They include an analysis of current conditions and use, and an estimate of total capability for each resource class. They also include a profile of ecosystem characteristics and trends in quality. These analyses are based upon all available resource inventory data.

General Social and Economic Data (Socio-Economic Profile) These are maintained for substate regions composed of county groupings conducive to social and economic data aggregation and analysis. They include an identification and analysis of social, economic, intergovernmental and coordination issues, along with problems and trends affecting national resource lands divided into three parts: socio-economic factors; infrastructure systems; and Bureau relationships with planning use control groups, action, study and interest groups, and key individuals.

Applied Social and Economic Data (Planning Area Analysis) These analyses are prepared for planning units, or combinations of planning units, if a Management Framework Plan is to include more than one planning unit. The Planning Area Analyses are organized into several major sections including: socio-economic analysis and development of regional and local demand projections for national resource lands' (NRL) resource products; analysis of NRL significance to the area and regional populations' cultural values, social well being, and expectations; analysis of NRL significance to a variety of infrastructures and the significance of these infrastructures to the NRL; and analysis of extent and implications of "critical environmental areas" as defined by state or federal laws. National and regional analysis of timber requirements and alternative sources are critical data inputs to both the Socio-Economic Profile and the Planning Area Analysis.

Public Participation - In consulation with a variety of public groups, including all those listed in the Socio-Economic Profile, the BLM planning team pulls together all public input including land-use and resource trade-offs. BLM's objective is to ensure that all concerned and interested citizens, either individually or in organized groups, have an opportunity to fully understand the values of the national resource lands and related alternate uses, and then have an opportunity to contribute their ideas, knowledge, and proposals in the planning process. This results in a wide variety of meetings and consultations, tailored to the needs of the public involved. In developing the current program, for example, the Bureau invited (through various news media) interested groups, institutions, organizations and individuals to attend and participate in public meetings on its Management Framework Plans. Based on the comments derived through these meetings, planning documents and, consequently, proposed land-use decisions were revised, as necessary, to reflect the public input. As existing land-use plans are updated or new plans are developed more detailed, sophisticated, and intensive public participation plans will be utilized to assure maximum public involvement in the Bureau planning process.

Planning Decision Component

Management Framework Plan (MFP's) are prepared through a three-step process using all the above-described policy guidance and information. They are prepared and maintained for planning units or combinations of planning units. The first step is preparation of objectives and recommendations for each resource activity or between commodities within an activity without concern for overlap or conflict between activities. These become alternatives or options for later consideration. These must be acceptable considering social, economic, institutional and policy points of issue. The second step is the identification and analysis of interactions between the recommendations prepared for the seven resource activities. This includes analyzing their impact on social, economic, institutional, environmental and resource values, and the development of alternative solutions for major competitive situations. The Bureau does not have a single objective or absolute policy guide for resolving conflicts. Rather, an attempt is made for a multiple-use compromise which will maximize overall public satisfaction. The third step is the review of all data by authorized decision makers (State Directors and District Managers) and explicit selection and approval of specific alternatives resulting in a clear planning decision.

The resulting planning decision for timber will indicate areas planned for forest management and will identify the general stipulations and mitigative measures necessary to reasonably protect other resource values. Consequently, the Bureau Planning System represents the process in which many of the mitigative measures described in Chapter IV are brought to bear in shaping the timber management program.

BLM Environmental Analysis System

Environmental Assessment - A great deal of environmental assessment occurs in the preparation of Management Framework Plans (MFP) as indicated above. However, there are many situations where more detailed and specific assessments are needed to consider specific alternative action proposals which are within the framework of the MFP. The environmental assessment is especially important in situations where a Management Framework Plan has not yet been prepared, or where data have changed and the MFP has not yet been revised.

As a result of this evaluation, the Bureau has developed a system of environmental analysis having these major characteristics:

Purpose:

The purpose of the environmental analysis is to identify ways to minimize adverse environmental impacts in the consideration of an action not requiring an environmental statement, and as a means for determining whether conditions are such that an environmental impact statement is needed. An environmental analysis is not a decision-making document.

Scope of Use:

Environmental analyses are prepared for all proposed Bureau actions where there is potential for environmental impact and at the point in the decision-making where such analysis will be most effective. Bureau guidelines identify 57 different types of actions which might require environmental analysis. Environmental analyses are prepared for all proposed timber sales, reforestation projects, thinning contracts, and other significant forest management activities. Bureau policy requires that the public be permitted to review and comment on these environmental analysis documents.

Content of an Environmental Analysis:

The Environmental Analysis includes a standard format. The following sections are provided:

Description of the Proposed Action and Alternatives
Description of the Environment
Analysis of Proposed Action and Alternatives
Environmental Impacts of the Proposed Action

- Anticipated Impacts
- Possible Mitigating or Enhancing Measures
- Recommendation for Mitigating or Enhancing
- Residual Impacts
- Relationship between Short-Term Use and Long-Term Productivity
- Irreversible and irretrievable Commitment of Resources

Persons, Groups, and Organizations Consulted
Intensity of Public Interest
Participating Staff

Analytical Concept

The analysis is based upon first identifying and describing elements of the present environment. A standard classification structure of 10 environmental components including 58 elements is provided (Appendix E). An assessment is made as to the existing quality or trend of each element involved and the impact of each discrete part of the proposed action and alternatives on each element. This detailed analysis provides a basis for understanding the cumulative impact of various alternatives, finding the least environmentally damaging alternative, and finding the most effective mitigative measures.

Environmental Impact Statements - BLM approaches the preparation of environmental statements from two program perspectives -- first, from the "top down." Environmental impact statements are prepared for entire program areas (i.e., nationally, regionally or locally) to explore the environmental impact of existing or proposed program systems. From the "bottom up," environmental impact statements are prepared where the environmental analysis (i.e., for individual timber sales) indicates a need for a statement and this need is confirmed by management decision at the Director's level.

The procedures for preparing environmental impact statements are well established in the Council on Environmental Quality guidelines and Departmental procedures, and are not discussed here.

D. Timber Management Procedures and Practices

The primary objective of the timber management program is to produce a high level of raw material from forest lands classified as available for timber production, subject to the principles of multiple-use, sustained-yield and environmental quality. In addition to the laws setting forth these principles (Chapter I, paragraph B), the program is designed to support the Housing and Urban Development Act of 1968. This law specifies a substantial increase in the supply of raw material from all federal forest lands to help meet housing goals. This same goal was expressed in the President's June 19, 1970, statement instructing the Secretary of the Interior to: "Improve the level and quality of management of forest land . . . to permit increased harvest of softwood timber . . . to meet out housing goals."

The amount of timber to be harvested represents one of the major quantifiable elements of the timber program that can be directly correlated to management objectives identified in Chapter I, B. Consequently, the policies that are followed in planning the level of production warrant mention.

The primary determinants of the level of production, commonly referred to as the allowable cut, is expressed in simplified terms as being the amount of land available for the commercial production of trees and the expected yields from these trees, now and in the future. These determinants are, in turn, a function of such variables as land use, the regulation of wood flow, and the intensity of the timber utilization and management program and the length of the planning horizon. The major policies that address themselves to these variables and are followed in planning the timber management program, in terms of the allowable cut, are briefly as follows:[3]

- The size of the area for which an allowable cut is determined shall be such as to permit access to a sustained source of timber for each of its substantial markets or its clusters of communities within which conversion facilities are sufficiently varied to utilize the timber output.

- The allowable cut shall include only commercial forest land (i.e., forest land capable of producing at least 20 cubic feet of wood per acre per year of commercial tree species) judged to be suitable and available for sustained timber production. Forested lands managed for aesthetic, recreational, watershed and other uses are compatible with limited timber production. However, their yields shall be adjusted to reflect any modified management of cutting practices which reduce timber productivity.

- The allowable cut shall be based on the principle of sustained-yield which requires planning for a high level and undiminishing flow of wood over time. While the actual harvest may vary from year to year, the principle shall be considered fulfilled if the average annual output for each ten-year period promises to remain constant or increase from one decade to the next.

- The allowable cut level shall include the volume from all planned timber harvesting practices such as final harvest, mortality salvage and commercial thinning. Their individual outputs may vary from decade to decade; however, in total they shall meet the sustained-yield principle.

- The unit of measure used in the allowable cut shall provide an accurate measure of the end product objective, e.g., sawlogs, pulpwood, etc. Additionally, trends in efficiency in the utilization of trees harvested will be recognized in the allowable cut.

- The influence of present and future intensive management practices, e.g., precommercial and commercial thinnings, shall be reflected immediately in the allowable cut when included in the timber management program. However, before any practice is considered for inclusion, it shall first be analyzed for environmental, technical and economic feasibility.

- Forecasts of present trends or future changes will be part of allowable cut planning. The planning horizon should be flexible, with short horizons in some cases and long horizons in others. Normally the second decade shall represent the period upon which future practices shall be based. While no major developments or innovations beyond this twenty-year period shall be assumed, the practices forecast to be in effect by this time shall be considered as ongoing programs thereafter.

- Generally, the allowable cut will be recomputed every ten years for a given planning unit to coincide with the normal ten-year inventory cycle. However, if the situation warrants, it may be recomputed at any time in order to reflect catastrophic losses, policy, procedural and land-use changes, or other changes in the assumptions underlying the existing cut. Any potential changes in the allowable cut shall be analyzed in the context of environmental protection and the carrying capacity of the specific land units involved.

The implementation of these policies in arriving at an allowable cut is accomplished by use of a computerized forest simulation model developed by the Bureau in 1969 for long-range planning. This model projects the forest lands classified as available for timber production into the future in order to measure the effects of alternative timber management program levels on the allowable cut.* Program levels may be defined as management intensities relative to the inclusion of such practices as genetics, brush and hardwood control, precommercial and commercial thinning and/or others. Consequently, the model permits alternative program levels to be evaluated on the basis of their respective production levels and economic efficiencies and, subsequently, serves as a basis for programing manpower and funds for the alternative selected. The selection of the alternative is guided by the Management Framework Plan, as described in the previous section, for the particular forest along with budgetary and manpower considerations. (Note: This model can also be used in the development of the Management Framework Plan during the forest land-use planning phase, as described in the section cited above, in identifying general program potential and in qualifying "trade-offs" in timber production when forest lands are excluded from cutting or subjected to reduced yields in deference to other forest values and uses.)

The selected alternative is subsequently translated into a short-range activity plan in terms of an annual program for a five-year period. Money and manpower needs in conjunction with planned accomplishments, consistent with the assumptions underlying the selected alternative, are identified for budgetary purposes. In addition to data directly related to timber management practices, the budget submission includes support services such as cadastral surveying, easement and right-of-way acquisition and engineering. The development of the timber management activity plan is coordinated with other resource activity plans, e.g., wildlife habitat and watershed. These coordinated activity plans together represent the forest management program for the planning unit.

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*Refer to BLM Manual 5240 and the Policies and Procedures for Planning the Allowable Cut, July 23, 1968, for further information regarding Allowable Cut Plann

One of the major inputs in formulating and in later implementing the timber management program is the annual timber sale plan. In addition to manpower and funding needs, this document sets forth general information for each proposed timber sale area in terms of its location, approximate volume to be harvested, cutting practices to be followed, method of logging, road construction and access requirements, special contractual provisions and other relevant data. As an integral part of the development of the annual sale plan, an environmental analysis record is prepared for each prospective sale. This environmental analysis report describes the environmental impacts and mitigative measures to be employed in planning and executing the various sale-associated actions. The sale plan is developed in accordance with the general land-use and timber management planning policies, as previuosly described, and the following major guidelines:[4]

- Roads and other facilities will be kept to the minimum and, where needed, will be located, designed and constructed to the standards necessary for the total land-use and resource values involved. Excavation will be limited to the minimum amount needed to meet the necessary standards. Planning will provide for stabilization of soil exposed and for rehabilitation of other environmental damage caused by construction.

- Cutting systems will be used which best meet the management goals and related land-use prescriptions and encourage prompt regeneration of the forest. Selection, shelterwood, clearcutting or their various modifications are available options. If clearcutting is determined to be the appropriate system, the cutting units should not exceed 40 acres in normal circumstances and shall be consistent with the guidelines prepared by the Federal Subcommittee on Public Lands on Clearcutting on Federal Timberlands (Appendix D). More than 40 acres may be appropriate for salvage of an area already damaged by fire, insect or wind, or where larger cutting units will minimize road construction.

- Cutting areas should be designed, using techniques of the environmental design arts, so that they blend naturally with topography and landscape. The cutting area design should, to the extent practical, minimize the effect on the total forest vista with due regard for future harvesting impacts of road constrction and other relevant factors.

- Slash and cull log disposal will be an integral part of sale planning with the emphasis on techniques that encourage the utilization of residual material. Preference in order of consideration is utilization, chipping, lopping and scattering, burying, piling and burning, and burning in place. Follow-up reforestation and intensive management requirements must be essential considerations in the selection.

- Assurance of regeneration by natural or artificial means must be an essential element of sale planning.

The timber sale plan is reviewed both internally and by the public prior to adoption to insure that proper and full consideration is given to technical, economic, social and environmental criteria. Comparable plans, including an environmental analysis record, are also developed and reviewed for the other timber management practices, e.g., reforestation, site and stand improvement, etc. Together, these plans constitute the proposed timber management program which is then subjected to final Congressional review and approval through the appropriation process prior to implementation.

The intensity of the Bureau's current timber management program varies among three general geographic areas; the forests of western Oregon are subjected to an intensive level of timber management; timber management in interior Alaska forests is essentially limited to fire protection; and the remaining forests are under a moderate program level. Consequently, these areas will be described individually in terms of the current ten-year program and expected future trends. Table I-1 summarizes the current and projected timber production levels for the three geographic areas. Table I-2 summarizes the timber management practices to be carried out by geographic area.

Western Oregon

Approximately 1.9 million acres of the 2.4 million acres of Bureau-administered lands, located on the Coast Range and the western approaches to the Cascade Mountains, are classified as available for timber production (Figure I-4 and Table I-3). These lands represent over 55 percent of the 3.4 million acres currently in the Bureau's total timber production base and are some of the most highly productive and intensively managed lands in the nation. The annual production from these lands is 1.172 billion board feet or 92 percent of the Bureau's total timber production and nearly 20 percent of the total wood harvested in western Oregon.

The annual production from Bureau-administered lands in western Oregon supports 13,500 primary jobs and 20,000 secondary jobs (retail trade, service, etc.). These jobs represent 8 percent of the total employment in the region and may range as high as 35 percent in some local areas.[40]

Table I-1

Current and Projected Timber Production Levels From National Resource Lands (All Geographic Areas)

Geographic Area	Net Annual Growth All Apecies	Annual Allowable Cut	
		Current 1/ Program Period	Projected 2/ Program Period
Western Oregon	360 million bd. ft.	1.172 billion bd. ft.	1.172 billion bd. ft. (estimated)
Remaining Forests	(Not available)	148 million bd. ft.	131 million bd. ft. (preliminary)
Alaska 3/	(Not available)	0	0

1/ Western Oregon = 1971 to 1981; Remaining Forests = 1965 to 1975.

2/ Western Oregon extensive forest inventory and update of land use plans currently underway; Remaining Forests inventory data is preliminary pending completion of land use plans and environmental assessment documents.

3/ Outputs unavailable due to land tenure adjustments.

TABLE I-1

TABLE I-2

TIMBER MANAGEMENT PRACTICES TO BE CARRIED OUT BY GEOGRAPHIC AREA

(Acres Affected Per Year/Decade Except As Otherwise Noted)

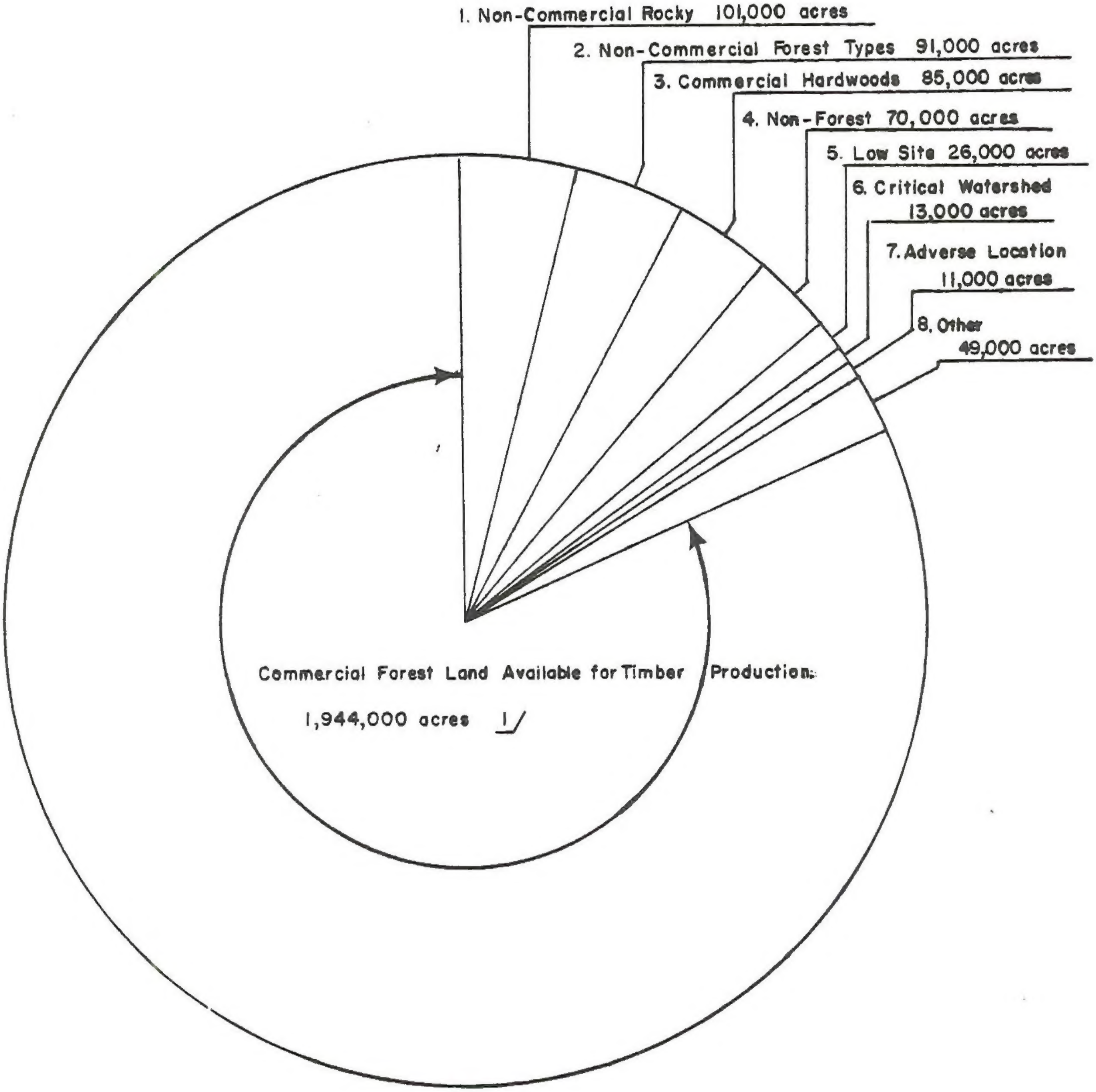
	Western Oregon		Alaska	Remaining Forests	
Development Practices	Acres/Yr.	Acres/Decade	Acres/Yr. 10/	Acres/Yr.	Acres/Decade
Tree Improvement	24,000 1/	240,000	0	0	0
Scarification	700	7,000	0	300	3,000
Mechanical Brush Cutting	0	0	0	> 100	> 1,000
Mechanical Trenching-Furrowing	0	0	0	0	0
Burning	9,000	90,000	0	> 100	> 1,000
Burying	> 100	> 1,000	0	> 100	> 1,000
Chipping	0	0	0	0	0
Seeding	300	3,000	0	50	500
Planting	23,000	230,000	0	2,400	24,000
Chemical Weed Control	5,000	50,000	0	100	1,000
Baiting	200 2/	2,000	0	1,000 9/	10,000
Fencing and Screening	0	0	0	0	0
Mulching	> 100	> 1,000	0	> 100	> 1,000
Snag Felling	0	0	0	0	0
Fertilization	1,500 3/	15,000	0	0	0
Precommercial Thinning	10,000	100,000	0	600	6,000
Pruning	0	0	0	0	0
Stand Conversion	370	3,700	0	0	0
Brush-Hardwood Control	20,000	200,000	0	0	0
Shading of Planted Seedling	400	4,000	0	0	0
Animal Damage Protection of Seedlings	150	1,500	0	0	0
Protection Practices					
Fire Control	--------------------Total of		275,000/yr.	(2,750,000/decade) 4/-------	
Insect Control	5/		0	5/	
Disease Control	5/		0	5/	
Harvesting Practices					
Commercial Thinning	2,400	24,000	0	500	5,000
Clearcutting	19,000	190,000	0	800	8,000
Partial Cutting (Includes Shelterwood, Seed Tree and Selection)	30,000	300,000	0	40,000 6/	400,000
Mortality Salvage	5,500	55,000	0	0	0
Tractor Logging	32,000 7/	320,000	0	28,500 7/	285,000
High-Lead Logging	16,000 7/	160,000	0	4,500 7/	45,000
Mobile Yarder Logging	6,000 7/	60,000	0	7,000 7/	70,000
Aerial Systems	3,000 8/	30,000	0	800 8/	8,000
Road Construction (Miles)	400	4,000	0	100	1,000
Road Maintenance (Miles)	5,000	50,000	0	500	5,000

1/ Annual acres to be planted with genetically improved stock during 1980-83.
2/ Projects for Fiscal Year 1975 only. None planned for FY '76 and '77.
3/ Operational test for Fiscal Year 1975. None planned for FY '76 and '77.
4/ Based on historical average 1969-73. Approximately 95% of the 275,000 acres burned will be in interior Alaska.
5/ Carried out through normal cutting practices.
6/ Shelterwood cutting is predominate practice.
7/ Acres will not be constant, but will decrease from year-to-year with increased use of aerial systems.
8/ Will increase from year-to-year.
9/ Acres will not be constant, but will vary from year-to-year.
10/ An undetermined amount of timber volume may be needed to fill local, domestic-use requirements and for oil exploration/pipeline construction purposes. These demands, however, are speculative and any such disposal will require environmental assessments.

WESTERN OREGON

Total Land Base - 2,391,000 acres

FIGURE I-4



1/ Includes 60,000 acres that will be taken out of production by roads in the future.

TABLE I-3

LAND CLASSIFIED AS NOT AVAILABLE FOR TIMBER PRODUCTION
WESTERN OREGON

DISTRICT ACRES

LAND CLASSIFICATIONS FOR OTHER THAN TIMBER VALUES 2]	SALEM	EUGENE	ROSEBURG	MEDFORD	COOS BAY	WESTERN OREGON TOTAL
	407,464 1]	317,505 1]	424,521 1]	911,684 1]	329,878 1]	2,391,052 1]
CRITICAL WATERSHED	2,317	874	-	9,902	-	13,093
FRAGILE SITE	10,472	346	9,914	69,053	11,574	101,359
LOW SITE	1,161	-	997	21,670	1,764	25,592
NON-FOREST	13,301	9,158	13,930	28,808	5,337	70,534
ADVERSE LOCATION	135	-	-	8,036	2,365	10,536
NON-COMMERCIAL TYPE	2,212	-	2,907	84,584	1,764	91,467
COMMERCIAL HARDWOODS	26,174	8,172	20,685	-	29,873	84,904
RECREATION AREAS	5,753	1,863	524	4,365	2,990	15,495
STREAMSIDE CORRIDORS	1,599	600	-	-	4,351	6,550
WILD & SCENIC RIVERS	-	-	-	8,217	-	8,217
SCENIC CORRIDORS & BUFFERS	2,768	233	4	11,995	1,357	16,357
SCENIC AREAS	751	-	-	-	2,282	3,033
TOTAL PROTECTED AREA	66,643	21,246	48,961	246,630	63,657	447,137
PERCENT OF TOTAL AREA PROTECTED	16%	7%	12%	27%	19%	19%
COMMERCIAL FOREST LAND AVAILABLE FOR TIMBER PRODUCTION 3]	340,821	296,259	375,560	665,054	266,221	1,943,915

1] TOTAL LAND BASE

2) TERMS DEFINED IN GLOSSARY

3) SEE FIGURE I-5

Approximately 80 percent of the current annual production is in the form of old-growth Douglas-fir. The forests support approximately 50 billion board feet of merchantable timber and have an annual net growth of 360 million board feet. The fact that the annual production of 1.172 billion board feet is approximately three times greater than the current annual growth is due to the extensive old-growth stands having low or negative growth rates. This is to say that the annual mortality nearly equals or exceeds the annual growth of wood on the surviving trees. Current plans call for the harvest of the old-growth timber on lands available for timber production over the next twenty year period. The highest priority is given to the harvest of decadent, old-growth stands in order to minimize the risk of insect and disease infestations, to utilize dead and dying trees which would otherwise rot if not logged, and to utilize the full growth potential of the site. As old-growth stands are replaced with thrifty, young-growth stands, the annual growth rates will increase over time. Based on the projections made by the computerized simulation model used in developing the allowable cut, the gap between the annual cut and annual growth will progressively close over approximately a 70-year period at which time they will be the same, i.e., 1.172 billion board feet. By the year 2070, the forest will be growing at the rate of 1.275 billion board feet each year and producing crop trees averging 83 years in age. Consequently, based on the current timber management plan, the annual allowable cut will increase over time until it equals the annual growth of 1.275 billion board feet and will likely remain stable thereafter.

The current timber management program, which is an aggregation of individual programs for 13 sustained-yield units (Table I-4 and Figure I-5), was adopted in 1971 and is based on the policies and procedures described in Sections B, C, and D in this chapter.[1] One of the significant elements of this program is the exclusion of 447,000 acres, including 70,534 acres of non-forest lands, from the timber production base (Table I-3). Additionally, 154,000 acres of commercial forest lands will be restricted to modified cutting practices in order to protect and provide for other forest values and uses (Table I-5). Some of the benefits of cutting restrictions are:*

- Protection of 78 existing and 172 potential recreation sites.
- Protection of 114,000 acres critical watershed and fragile site.
- Protection of 47 miles of wild and scenic rivers.
- Protection of 2,000 miles of streamside protective corridors.
- Protection of 380 miles of scenic roadside corridors.
- Protection of 3,000 acres of designated scenic and research natural areas.

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* Identified in greater detail in planning unit documents located in respective district offices.

Table I-4

13 Sustained Yield Units In Western Oregon

Sustained Yield Unit	Annual Allowable Cut (MM bd. ft. Scrib.)	District
1. Alsea-Rickreall	81	Salem
2. Columbia	77	Salem
3. Clackamas-Mollala	32	Salem
4. Santiam	54	Salem
5. Upper Willamette	109	Eugene
6. Siuslaw	110	Eugene
7. South Umpqua	43	Roseburg
8. Douglas	158	Roseburg
9. Josephine	146	Medford
10. Jackson	103	Medford
11. Klamath	25	Medford
12. South Coast	226	Coos Bay
13. Curry	8	Coos Bay
TOTAL	1,172	

Western Oregon Districts and Sustained Yield Units (SYU)

FIGURE I-5

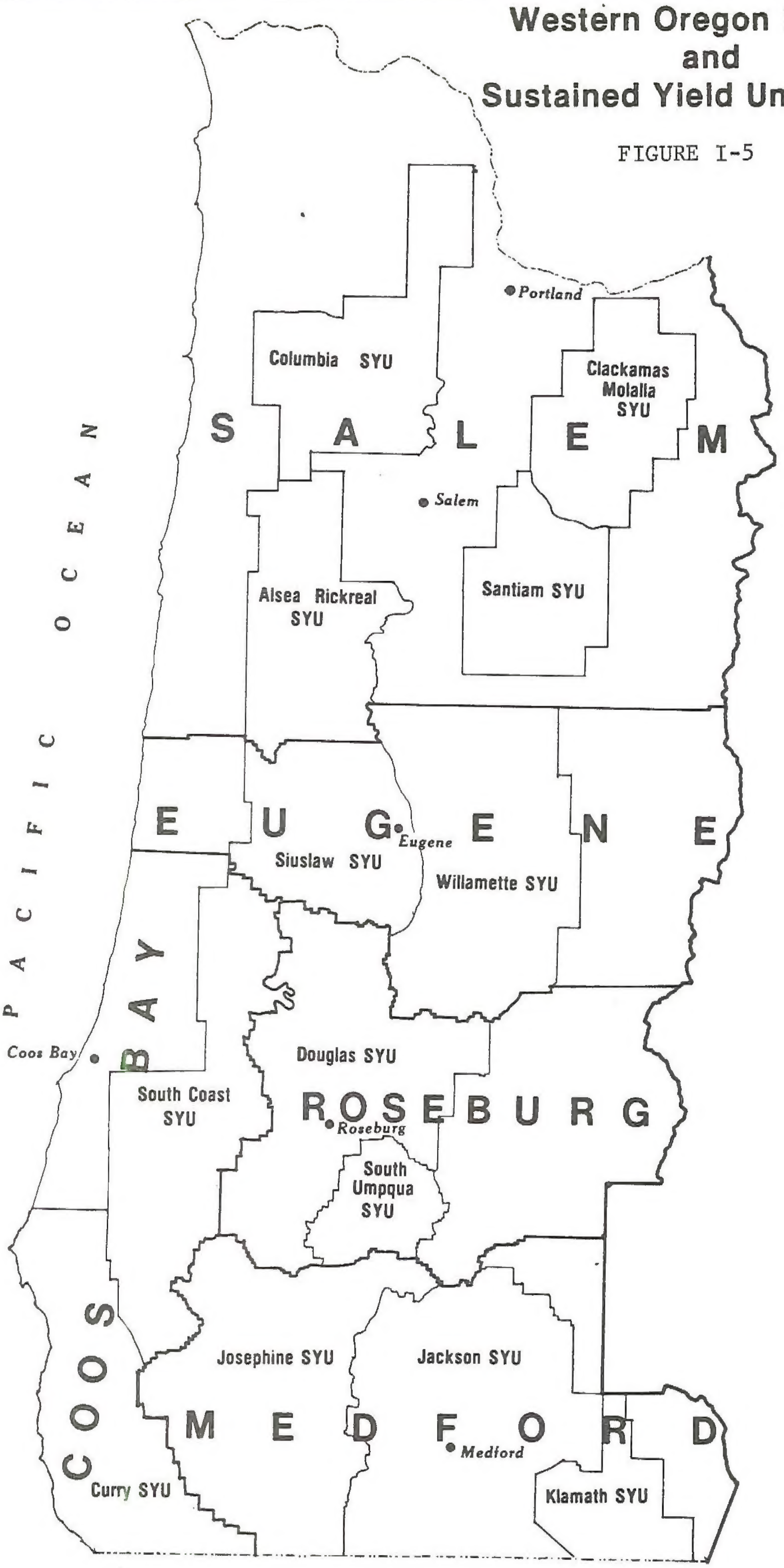

TABLE NO. I-5

WESTERN OREGON

COMMERCIAL FOREST LAND RESTRICTED TO MODIFIED CUTTING

Sustained Yield Units	Recreation Areas and Others	Stream-side Corridors	Scenic Corridors and Buffer Zones	Scenic Areas	Total
Alsea-Rickreall	-	351	636	-	987
Columbia	-	12	1,376	3,299	4,687
Clackamas-Mollala	649	1,914	539	228	3,330
Santiam	3,729	5,596	750	716	10,791
Upper Willamette	-	3,247	4,028	1,400	8,675
Siuslaw	-	4,785	41,260	-	46,045
Douglas	14,477	5,887	3,118	100	23,582
South Umpqua	21,300	2,183	2,694	-	26,177
South Coast	62	-	3,147	801	4,010
Curry	40	-	119	-	159
Josephine	-	3,816	3,246	-	7,062
Jackson	-	2,408	5,664	5,809	13,881
Klamath	-	1,406	3,370	-	4,776
TOTAL	40,257	31,605	69,947	12,353	154,162 [1]

All figures in acres

[1] Equal to 6% of the commercial forest land available for timber production.

In summary, about 19 percent of the land base (Table I-3) is restricted to no cutting because of other values or uses and about 6 percent of the lands available for timber production (Table I-5) are restricted to modified cutting. Thus, a total of 25 percent of the total land base is classified for no cutting or modified cutting practices in order to protect or enhance other forest resources and environmental values.

The western Oregon lands are currently undergoing an intensive inventory aimed at providing more detailed information regarding intensive management opportunities as well as other land uses and ecological data. As these inventories and others are completed on the thirteen individual sustained-yield units in western Oregon during fiscal years 1976-1982, their land-use plans and respective timber management programs will be updated to reflect any biological, technical, social, economic or other changes that have occurred since the previous programs were developed. The Bureau will also prepare environmental impact statements on the updated timber management programs covering each of the western Oregon sustained-yield units, beginning in fiscal year 1977 (Table I-6).

While it is difficult to predict what changes will occur as a result of intensive inventories and land-use planning revisions, it may be expected (based on past trends) that the timber production base acreage will be further reduced because of the multiple-use and environmental factors. This expected reduction may be partially or wholly offset by the inclusion of lands previously exempt from timber production or the lifting of management restrictions due to improved technology and management techniques. The extent of the acreage to be subjected to existing intensive timber management practices is not expected to change significantly in the revised programs. However, where significant changes to the base acreage are indicated, the revised program will be analyzed through the environmental assessment process to determine the effects of the proposed changes.

The use of a unit of measure, such as cubic feet, to reflect increasing utilization of wood material for multi-products may prove timely during this decade. These and other variables, along with any policy changes resulting from changing public needs, can influence the magnitude of the timber harvest level. Nonetheless, no major changes are foreseen at this time in the intensity of the western Oregon program and its corresponding level of timber production within the current 10-year program period.

The western Oregon timber management program calls for a number of actions to be carried out each year. These actions and the acreages impacted are itemized in Table I-2.

Table I-6

Schedule For Final Environmental Impact Statements For Western Oregon Sustained-Yield Units

Sustained-Yield Unit	Completion Date For Final EIS	District
Josephine	April 1, 1978	Medford
Jackson	July 1, 1979	Medford
Klamath	July 1, 1979	Medford
South Coast	July 1, 1980	Coos Bay
Curry	July 1, 1980	Coos Bay
Clackamas-Molalla	July 1, 1981	Salem
Santiam	July 1, 1981	Salem
Columbia	July 1, 1981	Salem
Alsea-Rickreall	July 1, 1981	Salem
South Umpqua	July 1, 1982	Roseburg
Douglas	July 1, 1982	Roseburg
Siuslaw	July 1, 1982	Eugene
Upper Willamette	July 1, 1982	Eugene

Alaska

The Bureau currently manages an estimated 19.5 million acres of commercial forest land in interior Alaska which support approximately 25 billion board feet of timber, primarily white spruce. Timber harvesting is extremely limited in these forests since they are remote, and transportion systems to far-off markets are not developed. Harvesting in these forests to date has been primarily limited to house-logs and firewood to meet the domestic needs of scattered native inhabitants. In the past decade, timber sales have steadily decreased from 3.8 million board feet in 1964 to nearly zero in recent years. Recent drops are primarily attributable to the uncertainties of management created by the Alaska Statehood Act and the Alaska Native Claims Settlement Act.

Uncertainty is the key word in describing the potential development of the Bureau's Alaska timber resource because of unknown silvicultural systems, partially defined ecological relationships, divergent estimates of commercial forest area and inventory volumes, unknown future markets, undeveloped and unplotted transportation, and doubtful land tenure. An undetermined amount of timber volume may be needed to fill local, domestic-use requirements and for oil exploration/pipeline construction purposes.[2] These demands, however, are speculative and any such disposal will require an environmental assessment.

If demand does materialize, cutting units will be kept small; and harvest will be carried out only in areas which have been classified as available for timber production. It is expected that the thrust of the timber management program in interior Alaska will be in the continued protection of the timber resource from fire through prevention and suppression practices and in research related to white spruce silviculture.*

Remaining Forests

Based on preliminary data derived from recent inventories in the remaining forests, approximately 1.5 million acres of the 2.2 million acres of commercial forest lands will be available for timber production. These lands will be managed at a moderate level, falling approximately midway between the highly intensive program of western Oregon and the protection program of interior Alaska. The distribution of these commercial forest lands, which support 8 billion board feet over eleven western states, is as follows:

	Acres		Acres
Arizona	17,800	Oregon (eastern)	183,200
California	241,100	South Dakota	5,800
Colorado	438,900	Utah	5,400
Idaho	498,800	Washington	47,100
Montana	523,700	Wyoming	209,500
New Mexico	38,700		

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* A programmatic environmental impact statement is presently being prepared for all aspects of the Bureau's fire management program.

The current timber management program for these lands was developed in the mid 1960's. It is an aggregation of individual programs for 17 sustained-yield forests (Figure I-6). The annual production from these forests has fluctuated in recent years from 145 million board feet in 1968 to 37 million board feet in 1974. Reinventories of these forests initiated in 1971, along with additional Bureau planning and environ-mental responsibilities, represent the primary reason for this reduction because of the diversion of limited funds and manpower to these efforts. The approved fiscal year 1975 budget relaxed this constraint and permitted the offering of approximately 145 million board feet. Budget constraints in fiscal year 1976, however, required reduction in the program to target production levels as follows:

	Million Bd. Ft.
California	12
Colorado	9
Idaho	11
Montana	4
Eastern Oregon & Washington	12
Wyoming	2
	50

Annual harvest levels for the remainder of the program period are uncertain and will depend largely upon the acquisition of increased funding and manpower. The total acreage impacted by the timber management practices shown in Table I-2 will also depend upon future funding and manpower availability.

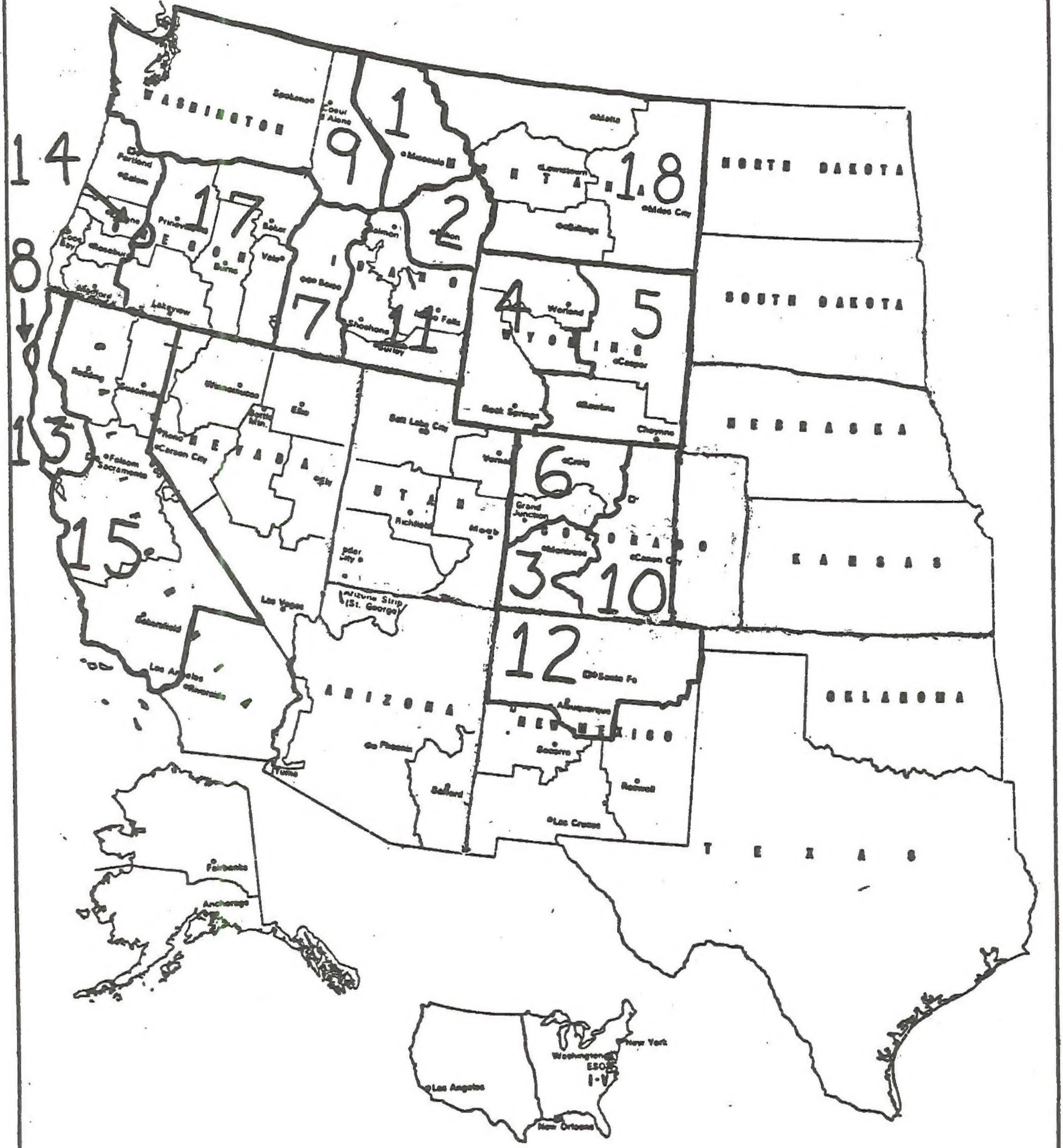
As stated previously, the reinventory of the remaining forests is currently in progress with the completion of the last unit scheduled in 1976. Preliminary land-use information, compiled from the inventories completed to date, is listed by state in Table I-7 (Preliminary Forest Land-Use Classification Acreages). Arizona, Utah and South Dakota are excluded from this table due to their limited timber management programs.

As more refined inventory information becomes available for each unit and the data is analyzed, revised timber management programs will be developed in conjunction with multiple-use management plans. Preliminary information, however, indicates that approximately 30% of the Commercial Forest Land (CFL) will be exempt from cutting because of environmental and other land-use considerations (Tables I-8 and I-9). Additionally, another 22% of the CFL will be designated for limited cutting, also because of environmental and other land-use considerations (Table I-9). Thus, preliminary information indicates that over 50% of all CFL's in the remaining public forests will be encumbered to varying degrees by restrictions on timber harvesting activities.

Remaining Forest

Sustained-Yield Units (SYU) [1/]

FIGURE I-6



June 1975

[1/] SYU No. 16 integrated into SYU No. 15 in Fiscal Year 1973

TABLE NO. I-7
PRELIMINARY FOREST LAND USE CLASSIFICATIONS ACREAGES FOR REMAINING FORESTS

LAND USED FOR OTHER THAN TIMBER VALUES	WASHINGTON 47,138/1		CALIFORNIA 241,143		COLORADO 438,869		IDAHO 498,756		MONTANA 523,738		NEW MEXICO 38,731		E. OREGON 183,207		WYOMING 209,548		TOTALS 2,181,130	
	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING	NO CUTTING	LIMITED CUTTING
WILDLIFE	0	0	196	2,968	0	10,716	11,285	25,200	27,030	9,208	0	0	3,731	2,779	8,542	65,878	50,784	116,749
STREAMSIDE CORRIDORS	0	0	1,916	10,124	3,800	5,378	2,163	12,435	1,962	2,899	0	0	0	1,061	5,524	1,717	15,365	33,614
WATERSHED PROTECTION	984	0	2,026	4,622	0	7,920	15,723	54,790	32,915	13,054	0	0	724	1,318	538	11,477	52,910	93,181
SCENIC CORRIDORS	1,950	310	2,117	10,579	2,703	9,918	6,458	18,110	16,772	6,540	337	0	724	6,213	529	5,828	31,590	57,498
RECREATION HISTORICAL ARCHEOLOGICAL	0	0	5,851	30	6,710	7,990	12,931	14,438	39,180	935	0	3,664	2,790	0	1,682	5,306	69,144	32,363
RESEARCH, NATURAL, STUDY, PRIMITIVE	0	0	5,477	0	28,781	0	5,515	0	56,878	0	5,639	0	2,537	0	17,702	0	122,529	0
OTHER	1,968	5,301	4,975	1,116	5,080	29,200	6,980	9,653	0	0	2,944	0	5,207	1,567	0	0	27,154	46,837
SUBTOTAL	4,902	5,611	22,558	29,439	47,074	71,122	61,055	134,626	174,737	32,636	8,920	3,664	15,713	12,938	34,517	90,206	369,476	380,242
TOPOGRAPHIC	3,141	0	17,186	17,805	186,868	0	5,087	71,053	32,204	500	3,004	0	12,787	7,662	14,423	2,238	274,700	99,258
TOTAL	8,043	5,611	39,744	47,244	233,942	71,122	66,142	205,679	206,941	33,136	11,924	3,664	28,500	20,600	48,940	92,444	644,176	479,500

/1 Commercial Forest Land

2 Limited Cutting - Acres on which full growth potential of trees is not realized due to lower levels of intensive timber management. Growth is forgone in favor of other resource values.

TABLE NO. I-8

SUMMARY BY STATES OF REMAINING FORESTS

	CFL*	NO CUTTING	LIMITED CUTTING	% NO CUTTING	% LIMITED CUTTING	% NO AND LIMITED CUTTING
CALIFORNIA	241,143	39,744	47,244	16.5	19.6	36.1
COLORADO	438,869	233,942	71,122	53.3	16.2	69.5
IDAHO	498,756	66,142	205,679	13.3	41.2	54.5
MONTANA	523,738	206,941	33,136	39.5	6.3	45.8
NEW MEXICO	38,731	11,924	3,664	30.8	9.5	40.3
E. OREGON	183,207	28,500	20,600	15.6	11.2	26.8
WASHINGTON	47,138	8,043	5,611	17.1	11.9	29.0
WYOMING	209,548	48,940	92,444	23.4	44.1	67.5
TOTAL	2,181,130 [1]	644,176	479,500	29.5	22.0	51.5

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* CFL - COMMERCIAL FOREST LAND

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[1] PUBLIC LAND STATISTICS 1973 SHOWS 1,632,700 ACRES OF COMMERCIAL FOREST LAND.

TABLE NO. I-9

SUMMARY OF REMAINING FOREST

LAND USE FOR OTHER THAN TIMBER VALUES	NO CUTTING % ACREAGE	LIMITED CUTTING % ACREAGE	TOTAL % OF ACREAGE
WILDLIFE	2.3	5.4	7.7
STREAMSIDE CORRIDORS	.7	1.5	2.2
WATERSHED PROTECTION	2.4	4.3	6.7
SCENIC CORRIDORS	1.5	2.6	4.1
RECREATION, HISTORICAL, ARCHEOLOGICAL	3.2	1.5	4.7
RESEARCH, NATURAL, STUDY AND PRIMITIVE	5.6	0	5.6
TOPOGRAPHIC	12.6	4.6	17.2
OTHER	1.2	2.1	3.3
	29.5	22.0	51.5

While it is difficult to anticipate the final results of inventory and planning efforts, it is expected that the amount of forest land available for timber production will be significantly reduced (as indicated by recent inventory data, Tables I-7 and I-8) due to other forest uses and environmental considerations. The Bureau is reviewing the timber management programs on each of the 17 sustained-yield forests outside western Oregon to determine whether the timber management program in each unit constitutes a major federal action significantly affecting the quality of the human environment, thus, requiring an environmental impact statement (EIS). To date, these reviews indicate that environmental impact statements will be necessary for Coeur d'Alene, Idaho and Ukiah, California sustained yield units (units number 9 and 13 as shown on Figure I-6). The final environmental impact statements for these two units will be completed by June 30, 1979, and September 30, 1980. respectively.

In addition to the impact statements identified above, detailed and comprehensive environmental analysis records (EAR's) will be prepared for the timber management programs for all other sustained yield units identified on Figure I-6. The schedule for the preparation of these documents is undetermined; however, EAR's will be prepared for the following sustained yield units by date indicated:

Area of Sustained Yield Unit	Unit No. (Figure I-6)	EAR Completion Date
California		
Susanville District Redding District Folsom District Bakersfield District	15	September 30, 1980
Idaho		
Salmon District Shoshone District Idaho Falls District Central Idaho	11	September 30, 1978
Montana		
Dillon District	2	September 30, 1977
Missoula District	1	September 30, 1976

Based on information provided by these environmental analysis records it may be determined that an environmental impact statement is also necessary. Such statements, if required, will be in conformance with Section 102(2)(c) of the National Environmental Policy Act of 1969.

It is expected that increased opportunities for capital investments to increase timber yields on lands classified for timber production will be identified and the management program intensified accordingly. These investments will primarily relate to increased reforestation and precommercial and commercial thinnings. Because of the foregoing off-setting factors, and provided that manpower and funding is available, it is anticipated that these lands could support an annual allowable cut of approximately 130 million board feet. Consequently, the annual production could support approximately 2,000 primary and secondary jobs.

In a longer timeframe, the projected trends in improved utilization, logging system technology, and increasing program intensification (as old-growth stands are replaced with young growth) can be expected to apply to these forests as well as those in western Oregon.

E. Forest Operational Practices

Individual practices are carried out on the ground, consistent with the approved timber management program, for the purpose of increasing the productivity of the timber resource and its availability for public use. They include protection, site preparation, seeding, planting, site and stand improvement, intermediate and final harvests, and the development of transportation systems.

Before describing the practices, it should be understood that many practices associated with timber production are not now being applied to all forest lands under the Bureau's administration, nor will they in the future because of technological, economic, or environmental constraints. For example, the forests of interior Alaska are currently subjected to few operational practices, including harvesting, primarily because of their isolation from existing utilization and market centers. In addition, certain practices such as fertilization are currently restricted to test areas in western Oregon in order to determine their possible impact on the environment. These points are raised to inform the reader that, while some of the described practices are not actively used in the current or projected program for certain forest areas, their potential for future application does exist.

The practices that are included in the timber management program are subjected to detailed, operational-planning evaluation and layout. This requires on-the-ground activities conducted by Bureau personnel prior to the action being taken such as field reconnaissance and data gathering, delineating the area to be planted, marking the trees or stands to be harvested, staking the road location, etc. The outgrowth of these activities is a detailed plan for a specific area and the action to be taken on it. As an integral part of the planning process, the environmental analysis record is reviewed and updated or modified accordingly. In addition, an environmental analysis record is prepared for each timber sale or project and an environmental impact statement written as determined necessary.

Since most practices are carried out by private parties, a contract (usually awarded on a bid basis) becomes the instruction for executing the particular action. For example, a timber sale contract is awarded to the highest bidder for a given stand of timber designated for harvest. The stipulations contained in the contract set forth the standards and specifications to be followed by the contractor in carrying out the action in accordance with Departmental and Bureau regulations and policies. These stipulations specify the measures for accomplishing the action and the manner in which the action shall be performed in order to minimize or eliminate its impact on the environment. The contract is administered through inspections by qualified Bureau personnel, usually once each week, to insure compliance to its intent and the terms contained therein.

The following practices will be described solely in terms of their physical or biological characteristics without regard to the mitigative measures actually employed in their planning and implementation. The extent of their application based on the current 10-year plan is also described.

1. Development Practices

Practices included in the development phase of the timber management program are primarily aimed at (1) reestablishing trees on forest land following harvest or natural catastrophies, and (2) insuring satisfactory or optimum growth of these forests.[5] Actions directly associated with timber harvest, such as cutting practices designed to provide regeneration through natural seeding, are discussed in part 3, Harvest Practices, even though they bear upon the questions of reestablishment and growth. The individual practices which follow are in the general order in which they might be carried out, although several may be accomplished simultaneously. Furthermore, not all of these practices are carried out on a given area since many of the practices represent alternative methods, the choice of which is dependent upon the conditions on the area.

a. Tree Improvement

Tree improvement programs are developed to optimize specific genetic characteristics such as growth rate, form, resistance to disease and drought, etc. Major efforts to date involve (1) development of fast-growing Douglas-fir and noble fir in the Horning Tree Seed Orchard, Mollala, Oregon, and (2) development of sugar pine trees resistant to white pine blister rust in the Sprague Tree Seed Orchard, Merlin, Oregon. The program provides genetically improved seed or seedlings for use in reforestation activities.

Tree improvement programs require development of (1) centrally located "seed orchards" where genetically improved seed can be produced, and (2) "progeny test areas" where improved seedlings can be grown and measured. Development of these areas often requires harvest of timber on selected sites followed by cultivation to prepare the site for planting. High values associated with seed orchards and progeny test areas often require control of insects and disease with insecticides and fungicides. Such pesticides are applied using hand-compression sprayers, gas bombs, injection or tractor-drawn ground sprayers. Use of pesticides, including type and quantity, is controlled by the U.S. Environmental Protection Agency (EPA) under existing federal laws, rules and regulations. Additionally, the U.S. Department of the Interior, acting within the constraints handed down by the EPA, further controls and monitors the authorized use of pesticides on all federal lands under its jurisdiction.

b. Scarification

Heavy machinery, such as a crawler tractor equipped with toothed brush-blades, is used to uproot woody vegetation and to pile it for burning, decomposition or disposal by burying. This activity is usually confined to flat or gentle topography and is used to prepare the site for seeding or planting by exposing mineral soil, conserving soil moisture, providing sunlight, destroying habitat of seed or seedling-eating animals and/or guarding against fire. Approximately 1000 acres, 700 of which are located in western Oregon, are scheduled for scarification annually.

c. Mechanical Brush Cutting

Heavy, tractor-drawn brush-cutters are used to chop and crush woody vegetation and debris in place in order to prepare the site for seeding or planting. While this practice has been recently applied to some 500 acres in Colorado, its use will be infrequent throughout the western states.

d. Mechanical Trenching - Furrowing

Tractor-drawn implements are used to construct furrows, trenches, or cleared spots in herbaceous vegetation prior to seeding or planting. No mechanical trenching and furrowing is planned at this time.

e. Area Burning

Burning may be for the purpose of preparing a site for reforestation, reducing potential fire hazards, and/or protecting existing stands by destroying material infected with insects or disease. It generally involves movement of one or more relatively continuous lines of fire for the purpose of destroying woody vegetation and debris, such as logging slash (Photo I-2). In conjunction with spot burning, approximately 9,000 acres will be burned each year, mostly in western Oregon. Area and spot burning may also require pre-treatment of the debris with approved desiccant chemicals to dry green vegetation prior to burning.

f. Spot Burning

Piles or concentrations of woody vegetation and debris (such as logging slash or slash from precommercial thinning) are destroyed by burning for the same purposes as described above.

g. Burying

Logging slash or debris is often buried in pits constructed by heavy equipment, such as crawler tractors. This practice will continue to be limited to the burying of logging debris resulting from road construction.

h. Chipping

Logging or thinning slash may be handled by chipping it and disposing of it onsite or in suitable disposal areas. Where market conditions for marginal material are favorable, chips may be transported to a utilization facility for end product manufacture. Logging residues (e.g., "chip cull" and "utility" logs) may also be hauled from the woods to the mill for conversion to chips, or it may be decked at convenient locations along forest roads for future sale when demand for chips will make residue conversion attractive to industry.

i. Lopping and Leaving; Lopping and Scattering

Slash created by logging or precommercial thinning is left in place or scattered by hand. These practices are more common in small timber or open stands of low-per-acre volumes where accumulations of heavy slash do not usually occur.

PHOTO I-2: Area burning of logging slash. This practice is used to prepare a site for reforestation, to reduce potential fire hazard, or to protect existing stands by destroying material infected with insects or disease.

j. Hand Clearing and Cleaning

Hand tools (such as hoes, axes, and power saws) may be used to clear vegetation and debris from individual planting or seeding spots or to remove competing vegetation from around existing trees. This practice will be carried out, as necessary, in conjunction with the planting of some 25,000 acres annually.

k. Seeding

In field seeding operations, seed may be scattered by helicopter or by crews walking over the area. Seed used in such operations is normally treated with chemicals to provide protection from seed-eating rodents and birds. Protection may be obtained when seed-eating rodents "learn" not to eat treated seed after having ingested sublethal amounts. Protection from birds may be obtained by changing seed color. Due to the banning of the chemical seed protectant, Endrin, seeding will be limited to approximately 350 acres a year.

l. Planting

Tree planting (Photos I-3 and I-4) is generally done by hand using tools such as hoes, mattocks, dibbles, or power augers. Tractor-drawn machines may be used where terrain is favorable. Trees used in planting are classified as "bare-root" or "containerized." Bare-root seedlings are removed from the ground in forest nurseries, packaged and transported to the forest to be planted. Containerized seedlings are grown in plastic or fiber containers. Depending upon the specific type of container, the tree planter may either remove the seedling from the container or he may plant the tree with the container.

Current plans call for the planting of 23,000 acres annually in western Oregon and 2,400 acres annually in the remaining, contiguous western states. Planting is usually confined to reforestation of recent clearcuts or interplanting of older clearcuts which are inadequate or non-stocked due to previous reforestation failures. The latter, which constitutes a reforestation backlog, currently amounts to 81,000 acres - 48,000 acres for western Oregon and 33,000 acres for the remaining forests, respectively.

Annual reforestation efforts include plans to reduce this backlog. Approximately 40 percent of the tree seedlings used are treated in the nursery with a chemical to repel animals that may otherwise feed upon them. Repellency may be secured by rendering the treated tree unpalatable; growth that occurs after planting is not protected by this chemical.

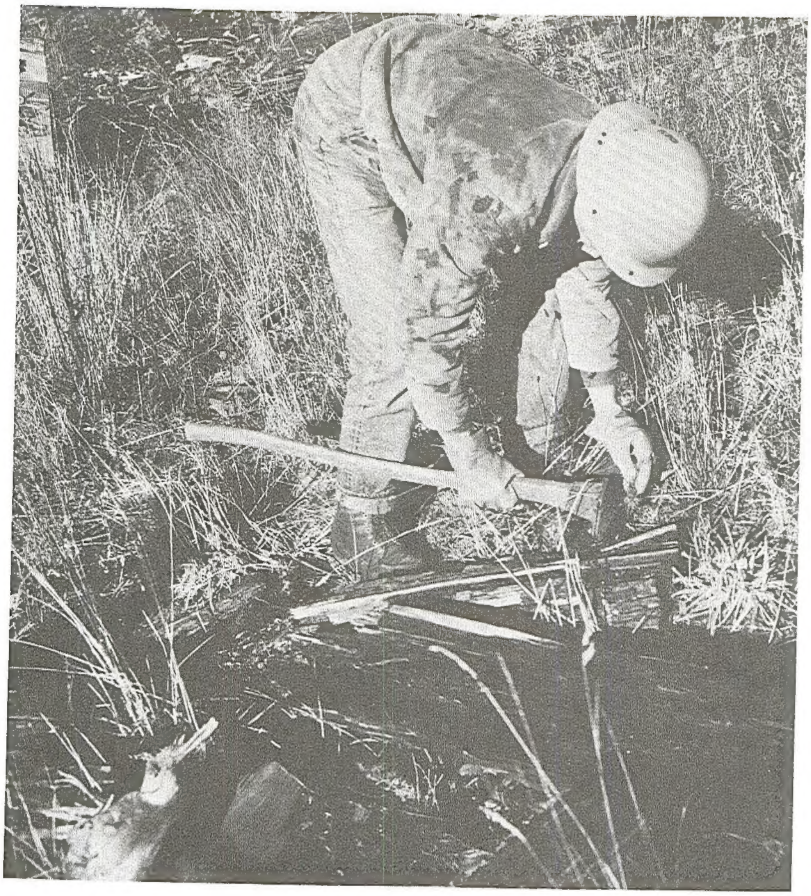


PHOTO I-3: Hand-planting two-year old seedling using mattock. Approximately 25,000 acres of forest land will be planted annually using techniques and devices similar to these.

PHOTO I-4: Tree planting crew reforesting cutover area.

m. Chemical Weed Control

Chemicals are applied to control herbaceous or woody vegetation prior to or following seeding or planting. Applications are made by aerial or hand methods. Current plans call for the spraying, mostly through aerial means, of about 5,000 acres annually during the program period. Approximately 100 acres in the remaining contiguous states will be subjected to chemical weed control each year. Commonly used pesticides are listed in Table I-10.

n. Baiting

Poisoned bait may be distributed aerially or by hand to kill animals such as mice, woodrats, rabbits, snowshoe hare or porcupines that eat seed or damage seedlings (Photo I-5). In fiscal year 1975, approximately 1,000 acres in Colorado were treated with strychnine-coated wheat to control gophers. The treated wheat was applied at about 11 pounds per acre. Placement was generally underground in the gopher runways. Additionally, 200 acres in western Oregon were experimentally treated with Rozal to control rodents. No baiting projects are planned for the immediate future in western Oregon.

o. Fencing and Screening

This involves construction of fences or screens to protect seed or seedlings from animal damage. Fencing generally involves protecting entire areas from domestic livestock or big-game animals by using screens to protect individual trees. Due to the costs involved, these practices are essentially limited to seed orchards and progeny outplanting areas in western Oregon. This practice has also been used in California to protect 200 acres of plantations established in critical watershed areas.

p. Mulching

This practice usually involves placement of paper or plastic mulch around individual trees to control competing herbaceous vegetation. This practice will have extremely limited application due to physical limitations and high costs.

q. Snag Felling

This practice involves the felling of dead trees which present a fire or safety hazard.

TABLE I-10

CHEMICALS AND PESTICIDES COMMONLY USED IN TIMBER MANAGEMENT ON BLM LANDS[1]

PESTICIDE	FUNCTION OF PESTICIDE
Silvex	Control of broadleaf brush for release of conifers.
2, 4-D	Control of broadleaf brush for release of conifers.
Tordon 101	Reforestation site preparation prior to planting. Controls woody plants. Also used as a stump treatment for control of hardwoods.
Tordon 10K	Pellet form of Tordon 101 - same use except not used for stump treatment.
Banvel 520	Used for brush control along road right-of-ways.
Diuron	Used for herbaceous weed control along road rights-of-ways.
Thiram	Used as a repellent on tree seedlings to prevent damage of seedlings by deer and rabbits.
Atrazine	Used to control annual grasses prior to planting and, after planting, to control competition.
Dalpon	Used to control perennial grasses prior to planting.
Strychnine	Used as a poison in controlling porcupines, gophers, marmots, mountain beaver.

CHEMICALS	FUNCTION OF CHEMICAL
Urea Pellets (45% N)	Used as a fertilizer.
Liquid Urea (33% N)	Used as a fertilizer.
Ammonium Compounds[2]	Used as a fire retardant.

[1] This is a list of the most common chemicals used in timber management. However, some insecticides and fungicides are also used in tree orchards and recreation sites to control insects and diseases.

[2] Ammonium polyphosphate, ammonium sulfate, diamonium phosphate.

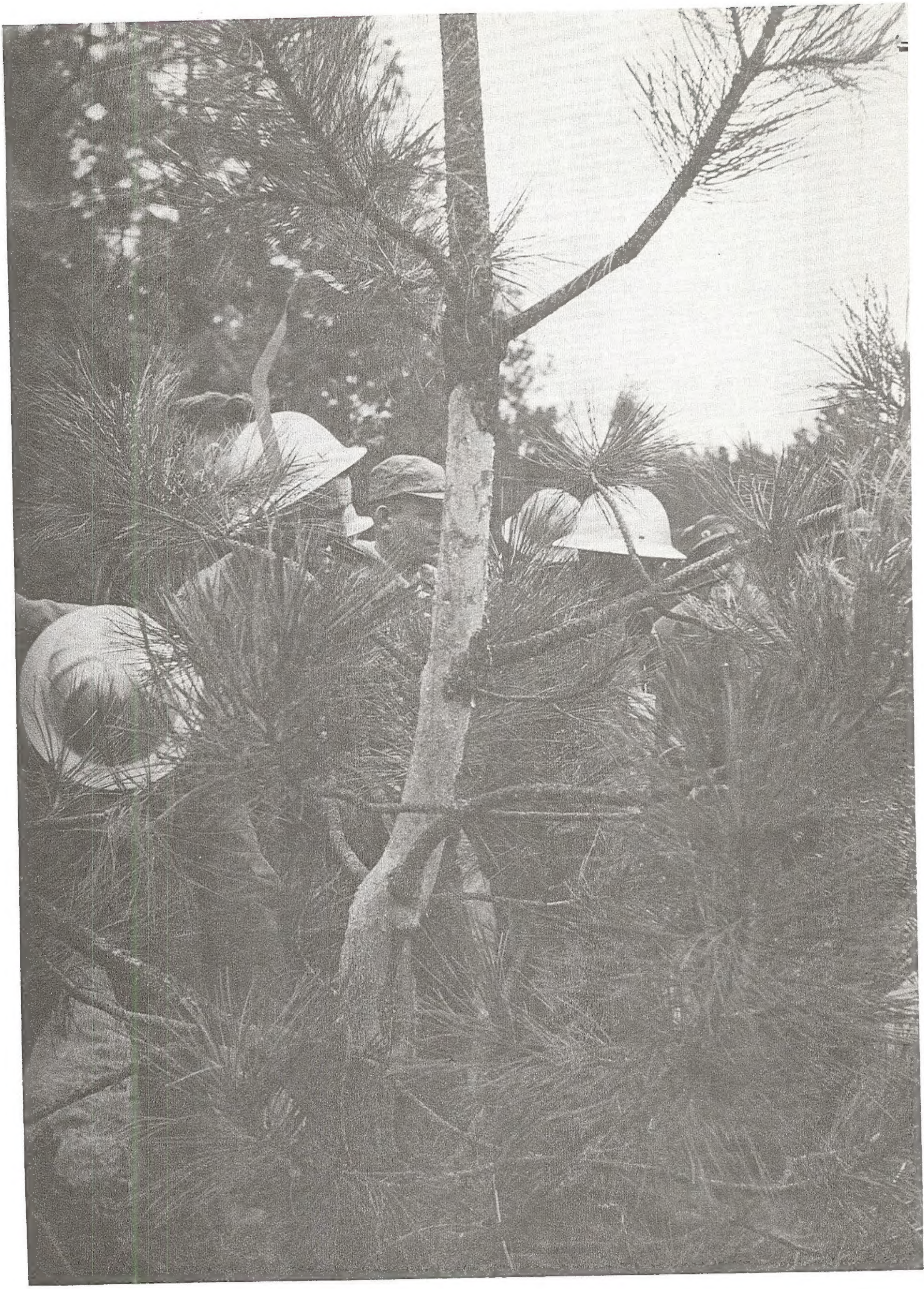


PHOTO I-5: Porcupine damaged ponderosa pine. Rodents may cause heavy damage to newly seeded areas or to established plantations. Damage such as shown in Photo I-5 may be controlled by baiting.

r. Fertilization

Nitrogen, in the form of urea prills, is the most commonly used forest fertilizer. Dispersal is usually by helicopter. Application rate is generally between 150 and 300 lbs. of effective nitrogen per acre. Although effects of a single application of fertilizer on annual growth can usually be continuously recorded over a 10-year period, there may be a marked reduction after approximately 5 years. Frequency of application, thus, ranges between 5 and 10 years depending on local conditions. Fertilization involves the movement of fertilizer from a supplier's base (by rail boxcar or truck and trailer) to an intermediate point. From the intermediate point (usually by dump truck), it is moved to the base of operation (airstrip or heliport). The operation may, thus, require construction or improvement of the forest road system to permit movement of large vehicles to the fertilization site. Heliports or airstrips may also have to be built.

At this time, fertilization is not an operational practice; however, in fiscal year 1975, 1,500 acres were fertilized in western Oregon for both economic and environmental feasibility testing.

s. Precommercial Thinning

Surplus trees in established stands of young, premerchantable timber are cut or poisoned to release selected trees from competition for light, moisture or nutrients, thereby concentrating growth potential of the stand on fewer trees of better quality (Photo I-6). The primary objectives of this practice are to produce merchantable wood volume and financial returns earlier than the unthinned forest and to produce more total wood for harvest.[6] Thinning of merchantable size stands is discussed in the section, Intermediate Cuttings.

Precommercial thinning may involve the use of power saws, chemicals (silvicides such as cacodylic acid or MSMA), axes or other tools to cut or poison individual surplus trees. Poisons are applied with injecting axes or other similar type equipment. Surplus trees are usually chosen from those trees whose crowns make up the general level of the stand canopy. Trees taller than the general level of the stand may be cut or poisoned only if soil moisture is a critical factor for increased growth of remaining trees.

Rows or strips of trees may also be cut or poisoned by a predetermined spacing or pattern with little or no regard for their position in the crown canopy.[7] This spacing system is usually limited to young, uniform stands and may also involve the use of heavy machinery, such as crawler tractors and tractor-drawn brush cutters, to crush strips of trees several feet wide leaving narrower strips of standing trees inbetween. Precommercial thinning may also be used to remove diseased trees in order to control an infection such as dwarf mistletoe.

PHOTO I-6: Surplus trees are removed in precommercial thinning. The primary objectives of this practice are to produce merchantable wood volume and financial returns earlier than in the unthinned forest.

Approximately 10,600 acres are scheduled for precommercial thinning each year, 10,000 acres of which will be in western Oregon. No precommercial thinning with chemicals is planned in the near future.

t. Pruning

Limbs of trees are cut from selected trees for the purpose of improving the quality of wood produced or to control disease (such as dwarf mistletoe). Due primarily to economic factors, no pruning is planned for the future.

u. Stand Conversion

Stand conversion generally involves the return of coniferous sites encroached upon by hardwoods to coniferous production. This action may include such practices as scarification, mechanical brush cutting, chemical spraying or harvest cutting. Currently, stand conversion is employed only in western Oregon on about 370 acres a year by harvesting mature stands of red alder and then reforesting with Douglas-fir.

v. Brush and Hardwood Control

This action is taken to reduce or eliminate competition from undesirable species of brush and hardwoods in young, established stands of desirable tree species. This action may also be employed to prepare an area for planting. The principal agents employed are chemicals; and, therefore, the impacts and mitigative measures are discussed under chemical weed control. In fiscal year 1975, 12,000 acres were aerially sprayed in western Oregon using Silvex, 2,4-D. In fiscal year 1976, approximately 25,000 acres will be similarly sprayed. An average of 20,000 acres will be sprayed annually for brush and hardwood control thereafter.

2. Protection Practices

The primary objective of the protection program is to eliminate or minimize losses to the timber resource and other forest resource values resulting from fire, insects and disease. Since the nature of these destructive agents and the practices employed in combating them vary, each will be discussed separately in the parts that follow.

a. Fire Control

Fire prevention activities are directed at reducing the number of man-caused fires or reducing the rate of spread of fires. These activities include reduction of risks and hazards, information and education programs, investigations and law enforcement. After a fire starts, suppression actions are used to control the fire. Hazard reduction includes such preventive or presuppression practices as slash disposal through chipping or burning, salvage of dead material, fire line construction around cutting units, road building, firebreaks, fuelbreaks, and snag felling. Some of these practices have several objectives and may be carried out in the course of the actions identified in this statement as Development, Harvest and Transportation. Therefore, they will be discussed under one of these headings rather than under Protection. Consequently, in this chapter and in subsequent chapters the Protection section will be limited to discussion of practices employed in the suppression or control of active fires.

The objective of fire suppression is to break the link between any two of the three principles of combustion at the most vulnerable place by the most practicable means available. These principles, often in combination with one another, can therefore be classified on the basis of the three sides of the triangle, as follows:

- Fuel. Reduction of fuels by breaking fuel continuity; accomplished by physical removal (construction of a fire line), making fuels less available (felling snags), making fuels unavoidable (backfiring or burning out), or by making them noninflammable through application of dirt, water, or chemicals.

- Oxygen. Reducing available oxygen by burning fuels in dirt, or by smothering them with water, fog or chemical substances.

- Temperature. Reduction of temperature through application of dirt, water, or chemicals and partial removal or separation of fuels.

Burning out or backfiring are methods of removing unburned fuels between an advancing fire and the fire control line. The purpose is to create an effective firebreak for suppression of the fire. These methods are used only when necessary, usually occur on large fires, and may be employed to a greater extent in some areas such as interior Alaska.

The application of water and chemical retardants in combating forest fires is accomplished by means of helicopters, fixed-wing aircraft, tank trucks and manually operated pumps. Chemical retardants approved for use are Phos-Chek 259, Phos-Chek XA, Fire-Trol 100 and Fire-Trol 931L. These retardants are ammonium compounds applied under guidelines for least environmental damage. Fire lines are constructed by hand tools and also by heavy equipment such as bulldozers.

Based on the period 1969-1973, an average of 275,000 acres was burned annually, 260,000 acres of which was in interior Alaska. Similar losses are anticipated for the remainder of the current program period. Currently an environmental statement on the fire management program is being prepared and will cover fire suppression in greater detail.

b. Insect Control

The objectives of forest-insect control are to prevent or suppress epidemic outbreaks and spread of injurious insects. With defoliator-type insects, the objective is to minimize the injury to vegetation until natural forces suppress the epidemic. In bark beetle control, the objective is to prevent or suppress the development of a large beetle population and to encourage the restoration of a natural balance.[8]

Insect control practices can be classified as silvicultural, biological, chemical and physical, the choice of which is primarily dependent upon the species of insect to be controlled, the degree of infestation, and the conditions that characterize the infested area.

(1) Silvicultural Control. This method employs the use of silvicultural practices directed toward preventing the occurrence of insect outbreaks as opposed to actions taken following insect infestations. It consists of maintaining the forest in a healthy condition and regulating its growth so that food conditions are unfavorable for injurious insects. The quantity and quality of insect food are controlled by regulating the composition, density, vigor and age of the stands.[9] Silvicultural practices include the salvage or burning of windfalls, slash, and other potential insect-breeding debris, and by cutting operations to remove the individual trees or stands most susceptible to insect attack. Under certain conditions, cutting and regeneration practices are employed in a manner to favor the creation of mixed timber stands since these are often less susceptible to insect damage than the pure stands. The objectives and practices associated with silvicultural control are, by their very nature, an integral and normal part of the timber management program and represent the predominant control measure to be employed on Bureau-administered forests.

(2) Biological Control. This method involves the use of living organisms which may be collected in an area where they are abundant or propagated under confinement and then are released from the air or ground into the infested area. These organisms can be classified as:

- Parasites -- usually the young life-forms of certain wasp and fly families.

- Predators -- such as lacewing flies, certain beetles, birds and mammals.

- Diseases -- caused by many different microorganisms, including viruses, bacteria and fungi.

While the use of biological control methods have had some spectacular results with agricultural crop pests, their effectiveness in combating forest pests has not been confirmed. Two microbial agents have, however, been tested on the Douglas-fir tussock moth and preliminary results appear promising.[10] Continued laboratory research and field testing will be necessary prior to its becoming operational.

(3) Chemical Control. This method involves the use of chemical insecticides which kill the insect by suffocation or by entry through the body wall, digestive tract, or respiratory system. Insecticides are classified as:

- Inorganic -- containing elements such as arsenic, flourine, mercury, copper or zinc.

- Botanical -- such as rotenone, nicotine and pyrethrum.

- Synthetic Organic -- includes the chlorinated hydrocarbons such as methoxychlor.

- Mineral Organic -- includes kerosene, fuel oil and lubricating oil which, along with water, are often also used as carriers for the other insecticides.

These chemical insecticides are applied to trees in a number of ways, the choice being dependent upon the insect involved, the insecticide used and its formulation, and the equipment available. The most common method, particularly in combating defoliating insects, is spraying or dusting from an aircraft. This method can be applied rapidly to large forested areas inaccessible from the ground. Ground methods usually involve hydraulic spraying equipment mounted on vehicles. Hand-operated units may be employed when total coverage of the tree or log is necessary. Mist blowers, utilizing engine-powered fans, can serve as mobile ground units to disseminate insecticides. Another method, used primarily for bark beetle larvae, involves the injection of chemical insecticides into the conductive tissue of the tree. These chemicals are taken up through the trunk causing mortality to the beetle larvae in the inner bark.

(4) Direct Physical Control. Mechanical and physical insect control methods usually directed at beetle-type insects include the following:

- Burning -- involves the burning of infected, unmarketable material in either tree, log, branch (following pruning) or bark (following peeling) after the material is piled or decked. It may also involve the burning of standing trees.

- Solar Radiation -- involves turning thin-barked logs so as to expose each beetle-infested side to full sunlight for several days.

- Logging -- involves the removal of marketable material to utilization centers and burning the residual infested material. With the exception of widespread infestations, this method is usually carried out with the "normal" timber management program.

- Trapping -- involves the use of light, insect attractants, and girdled and/or felled trees to attract insects. "Host" material, as applicable, is then usually destroyed by burning.

c. Disease Control

The objective of forest disease-control practices is to eliminate or minimize the occurrence or spread of heart rot, root rot, foliage infections, stem rust and other tree diseases. Diseases may be caused by the nonliving environment, such as unfavorable soil or atmospheric conditions, or by viruses whose nature is not well understood. The majority of diseases, however, are caused by the activities of living organisms, i.e., slime mold, bacteria, fungi, algae, seed plants and animals, including insects.[11]

Disease-control measures currently carried out in the forest are essentially limited to silvicultural or physical practices. While a chemical has been developed for treating stumps to prevent the spread of Fomes annosus (root and butt rot), the small amount of damage caused by this disease does not warrant its application. Chemicals are used, however, in nurseries and seed orchards for disease control. Thus, they are discussed under the Forest Development phase of the timber management program. Biological control, like chemical control, is limited by the current "state of the art" and, thus, its use will be limited. Consequently, biological and chemical control is not discussed further in this statement.

(1) Silvicultural Control. This method employs the use of silvicultural practices directed at the preventing or minimizing future disease outbreaks as opposed to actions taken following infections. These silvicultural practices include:

- Development of disease-resistant trees such as rust-resistant white pine and sugar pine.

- Development, where feasible, of mixed-species stands, particularly when diseases are host specific.

- Development of pure stands of naturally disease-resistant tree species were feasible.

- Avoiding damage to residual trees during logging operatons.
- Maintaining stands in a healthy and vigorous condition by regulating composition, density and age.

(2) Direct Physical Control. This method employs the use of physical or mechanical means to control existing disease infestations and to recover marketable material. Direct control practices currently being used are primarily limited to the control of dwarf mistletoe and are usually carried out by use of silvicultural practices. Dependent upon the degree of infection, stand composition, tree size and other variables, one of the following general approaches may be taken:

- Complete removal of all trees on and immediately adjacent to the infected area by cutting, burning or poisoning. Marketable material to be utilized.
- Removal of infected trees through precommercial thinning, commercial thinning or other partial cutting operations. Consists largely of discriminating against infected trees or disease-prone species in selecting trees to be cut.
- Pruning infected trees.

3. Harvest Practices

Harvest is the final phase of the timber production cycle and the first phase of the utilization cycle which represents the conversion of standing trees to commodity materials. Harvest includes the felling of marketable timber according to selected cutting practices, the movement of logs or trees from stump to loading points by use of logging systems, and their subsequent movement over transportation systems to manufacturing centers. Each of these three steps will be described separately in the parts that follow.

a. Cutting Practices

The selection of the appropriate cutting practices is basically a matter of silvicultural desirability; i.e., a certain practice or combination of practices is applied to a given timber stand in order to favor regeneration and/or to promote growth. An exception is the emergency situation in which trees killed or damaged by fire, insects, disease or weather are promptly removed in an unscheduled salvage cutting. Factors to be weighed in selecting the cutting practice include species composition, stand age, stocking and condition (as related to tree vigor and risk of mortality), site quality and regenerative capacity, fire and insect hazards which may be created by logging slash, topography, and anticipated effects of weather conditions on the residual stand. Consequently, because of the diverse nature of conditions within a given forest, a variety of cutting practices are followed. Once the cutting practice(s) is/are selected, those trees or areas designated for cutting and/or trees reserved from cutting are identified on the timber harvest area.

Cutting practices have been classified by different authorities in various ways, e.g., as silvicultural systems for obtaining natural reproduction by several means[12] and by nomenclature descriptive of the action taken.[13] A practical classification (for the purpose of this subsection) lists cutting practices in two major catergories, intermediate cuttings and final harvest cuttings, as follows:

(1) Intermediate Cuttings. These are practices applied prior to the major or final harvest of a stand[14] with the qualification that trees designated for cutting have commercial value.

(a) Commercial Thinnings. Various type and intensities of cutting are applied to immature stands for the purpose of redistributing growth on the uncut tree, to recover and use material that otherwise would be lost and to obtain greater total yield of merchantable material.[15, 16] Dependent upon the age of the stand and other factors, commercial thinnings (Photo I-7) are conducted at prescribed intervals over the life of the stand. Current plans call for the thinning of 2,400 acres annually in western Oregon and 500 acres annually in the remaining forests. Thinnings will occur at approximately 10-year intervals.

(b) Sanitation - Salvage Cuttings. These are made to remove individual trees killed or injured by fire, insects, fungi, etc., and to remove those trees likely to die prior to the final harvest in order to prevent the spread of insects or disease, and to utilize merchantable material before it becomes worthless.[17] Trees cut may be immature or mature, but tree condition, not age, is the criterion for removal. This practice is primarily limited to western Oregon, normally to the extent of 5,500 acres a year.

(c) Shelterwood Cuttings. This harvest method consists of removing mature timber from a stand in a series of cuttings extending over a period of years. In theory, the series is divided into three parts,[18] two of which are herein classified as intermediate cuttings. The third is classified as the shelterwood removal which is described under Final Harvest Cuttings:

- Preparatory Cutting prepares the stand for regeneration by removal of dying and defective trees and trees of undesirable species, prepares the seedbed and encourages seed production.18 This initial stand entry is planned for 30,000 acres annually in western Oregon. Approximately 40,000 acres in the remaining forests of the contiguous western states will receive a preparatory cut.

PHOTO I-7: Commercial thinning area. Harvest of a portion of the merchantable stems will redistribute growth on uncut trees; permits recovery and use of material that would otherwise be lost; and will permit greater total yield of merchantable material.

- Seed Cutting, (Photo I-8) further opens the stand prior to seeding, thus, making light and heat available to the seedlings.[20] This cut is carried out about 10 to 15 years after the preparatory cut.

(2) Final Harvest Cuttings. In contrast to intermediate cuttings, which include immature trees, final harvest cuttings usually remove only trees which have reached maturity.[19]

(a) Clearcutting (Photo I-9). Involves the removal of the entire stand in one cut.[20] This practice is commonly applied to even-aged stands in which most of the individual trees achieve maturity simultaneously. Species which commonly constitute such stands, e.g., Douglas-fir, are more or less intolerant (light demanding) and are most often effectively regenerated by clearcutting. This harvesting technique may also be used to salvage dead and damaged timber or to remove diseased trees to prevent spread of pathogens to the surrounding stands. Clearcutting in such instances may occur in either even-aged or uneven-aged stands. Approximately 19,500 acres will be clearcut each year in western Oregon. Additionally, about 800 acres will be clearcut in the remaining forests on an annual basis.

(b) Seed-tree Cutting. This practice involves the removal of the mature timber in one cut, except for seed trees (reserved for stand regeneration) left singly or in small groups (Photo I-10).[21] These seed trees may be subsequently harvested following reforestation of the area. Thus far, this cutting method has been limited to a few hundred acres annually. In western Oregon, it has been used experimentally around Tillamook. In the remaining forests, it is operational only in Montana.

(c) Selection Cutting. This method involves the removal of mature timber, usually the oldest or largest trees, either individually or in small groups at relatively short time intervals, commonly 5 to 20 years. Thus, the continuous establishment of natural reproduction is encouraged, and an uneven-aged stand is maintained.[22] The scope of this practice is geographically wide; it is applied to some extent to nearly all Bureau-administered forest lands in the contiguous western states, but especially to those lands in the Montane Sub-biome of the intermountain area and Rocky Mountain states, and southwestern Oregon.

(d) Shelterwood Removal Cutting. This represents the third and final phase in a series of shelterwood cuttings previously described under intermediate cuttings. Shelterwood removal cutting removes the remainder of the mature stand. This final phase occurs following establishment of reproduction.[23] Like the second cut or seed cut of the shelterwood system, little acreage will be subjected to the removal cut during this decade since the majority of timber sales will occur in mature, uncut forests using preparatory cutting techniques.

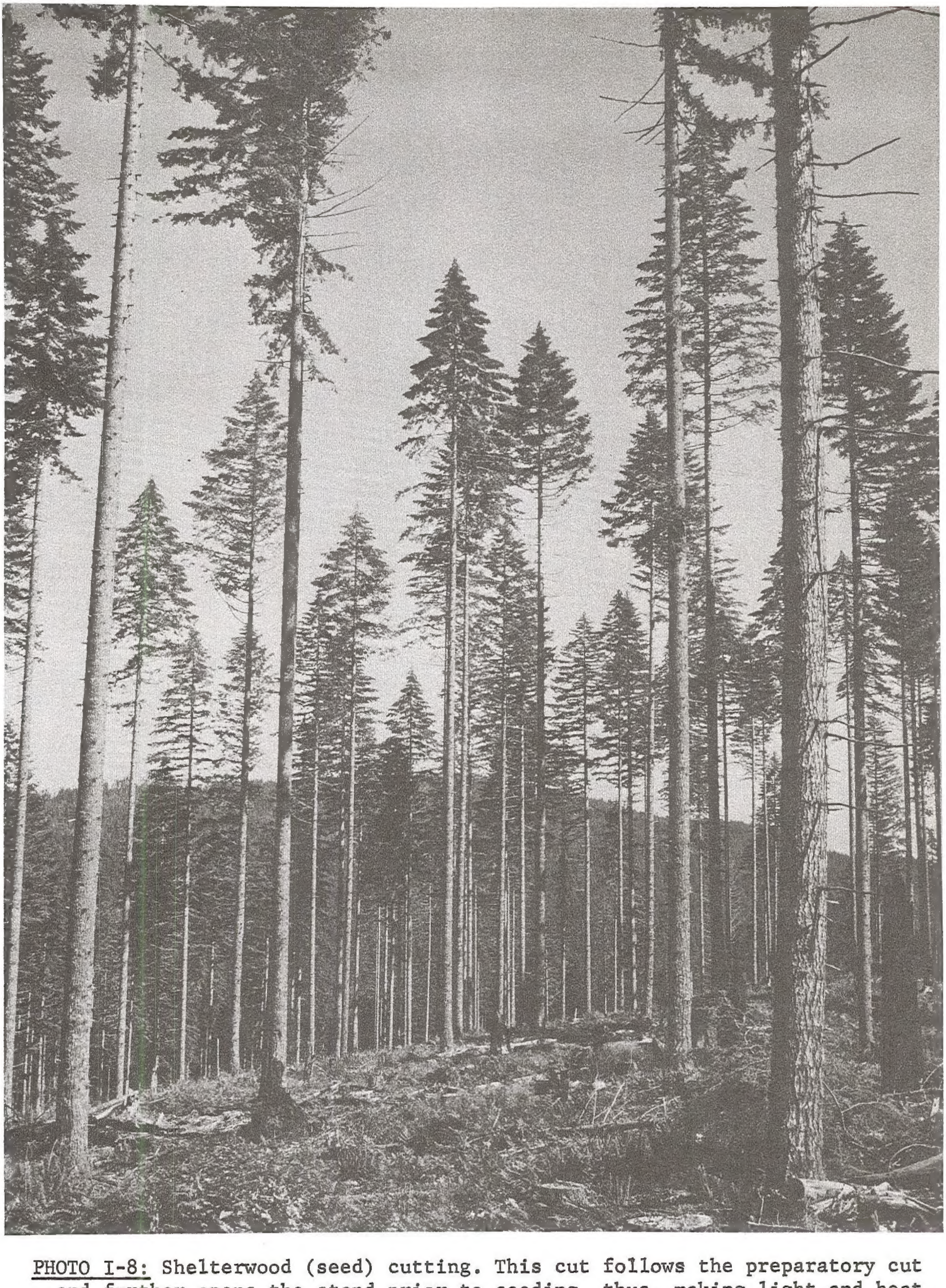


PHOTO I-8: Shelterwood (seed) cutting. This cut follows the preparatory cut and further opens the stand prior to seeding, thus, making light and heat available to the seedlings.

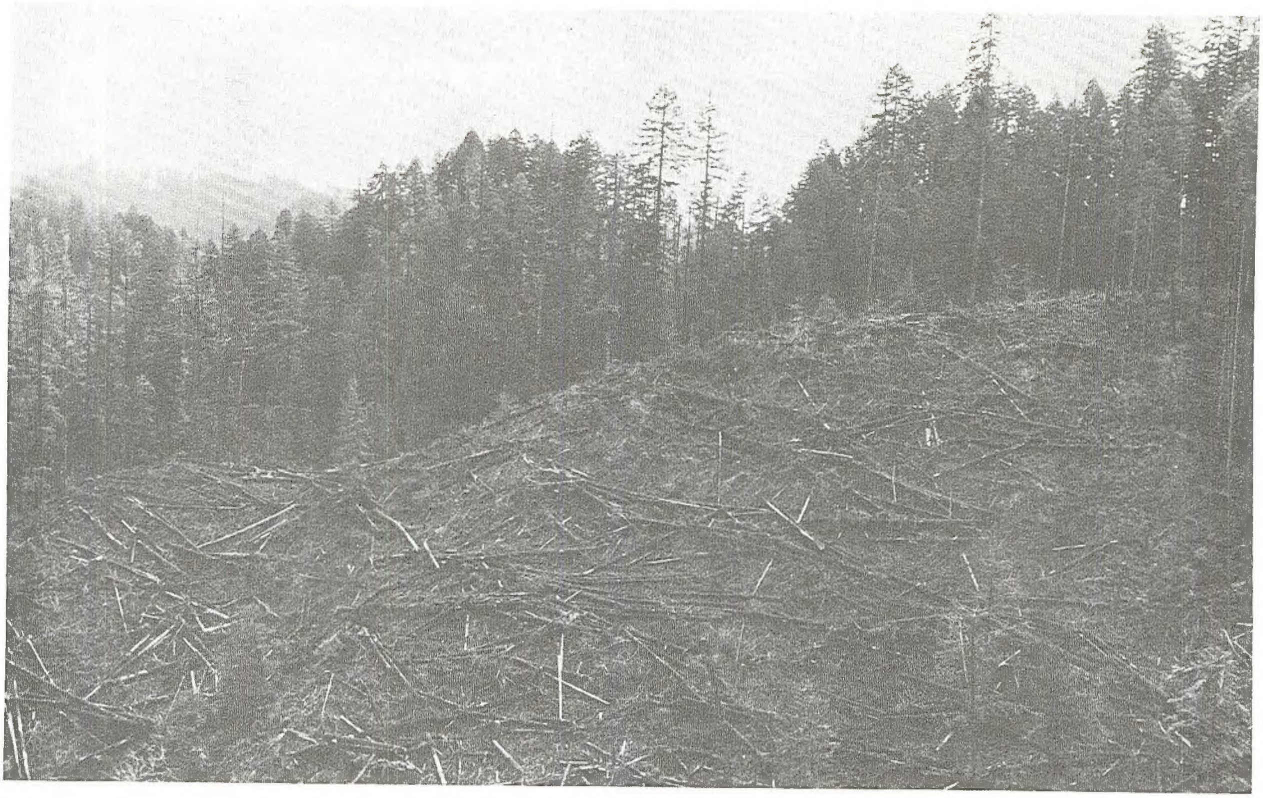


PHOTO I-9: Clearcut unit prior to log removal. This practice is commonly applied to even-aged stands.

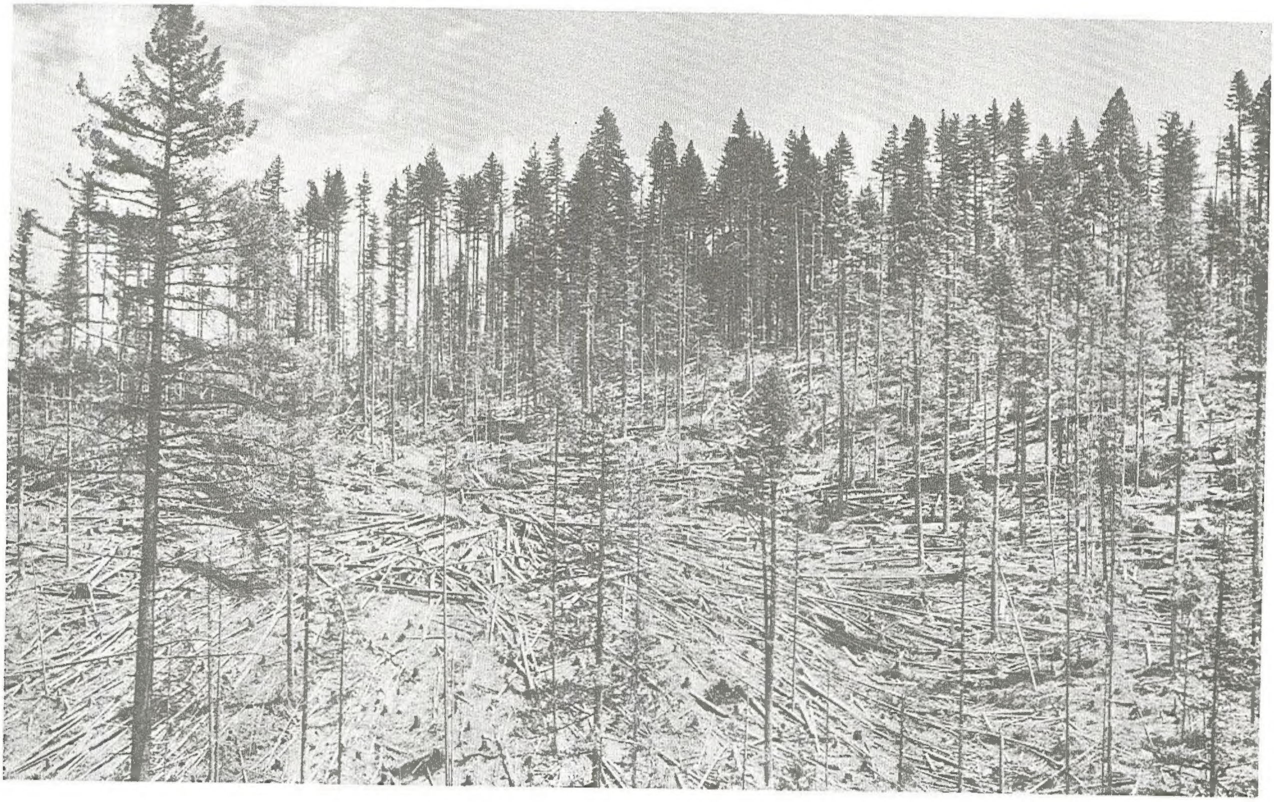


PHOTO I-10: Seed-tree cutting area prior to log removal. Remaining trees are left to regenerate the cutover area.

b. Logging Systems

The movement of felled timber to the loading point (landing) is accomplished through the use of a single system or combination of logging systems best suited for the area to be harvested. The selection is based on criteria which include:

- The physical requirements and capabilities of the applicable logging systems.
- The most economical combination of yarding costs, road construction costs, and major transportation costs.
- Silvicultural systems and cutting practices to be employed, and the priority sequence of harvesting.
- Protection of the reserve timber stand and preservation of soil and water resources.
- The safety of the people engaged in all phases of the harvesting operation.

While outside the scope of logging systems, the cutting or falling of trees and bucking (Photo I-11 and I-12) them into tree or log-lengths require some mention at this point. These operations are a prerequisite to the movement of trees or logs and constitute a major part of the logging operation. Trees are normally felled in a manner to minimize loss due to breakage and to minimize damage to the residual trees or adjacent stands. "Beds" are sometimes prepared to reduce breakage when very large trees are cut. In addition to topographical criteria, the system of logging to be employed is a factor in the manner and direction in which the trees are felled. In the falling and bucking operation, the chain saw is the common tool although mechanized blades mounted on mobile equipment are coming into more use, particularly in dealing with relatively small trees on gentle terrain.

The many logging systems available can be classified as ground or aerial systems, and they will be discussed on that basis.

(1) Ground Systems. These systems can move logs only by dragging (skidding) them along the ground. They are often called "conventional" systems because they were the original logging methods and continue to be more widely used than aerial logging systems. Ground systems are currently employed on about 90 percent of the lands subjected to timber harvest and will continue to remain the predominant practice in the near future. Following are brief descriptions of some ground systems used in logging operations.

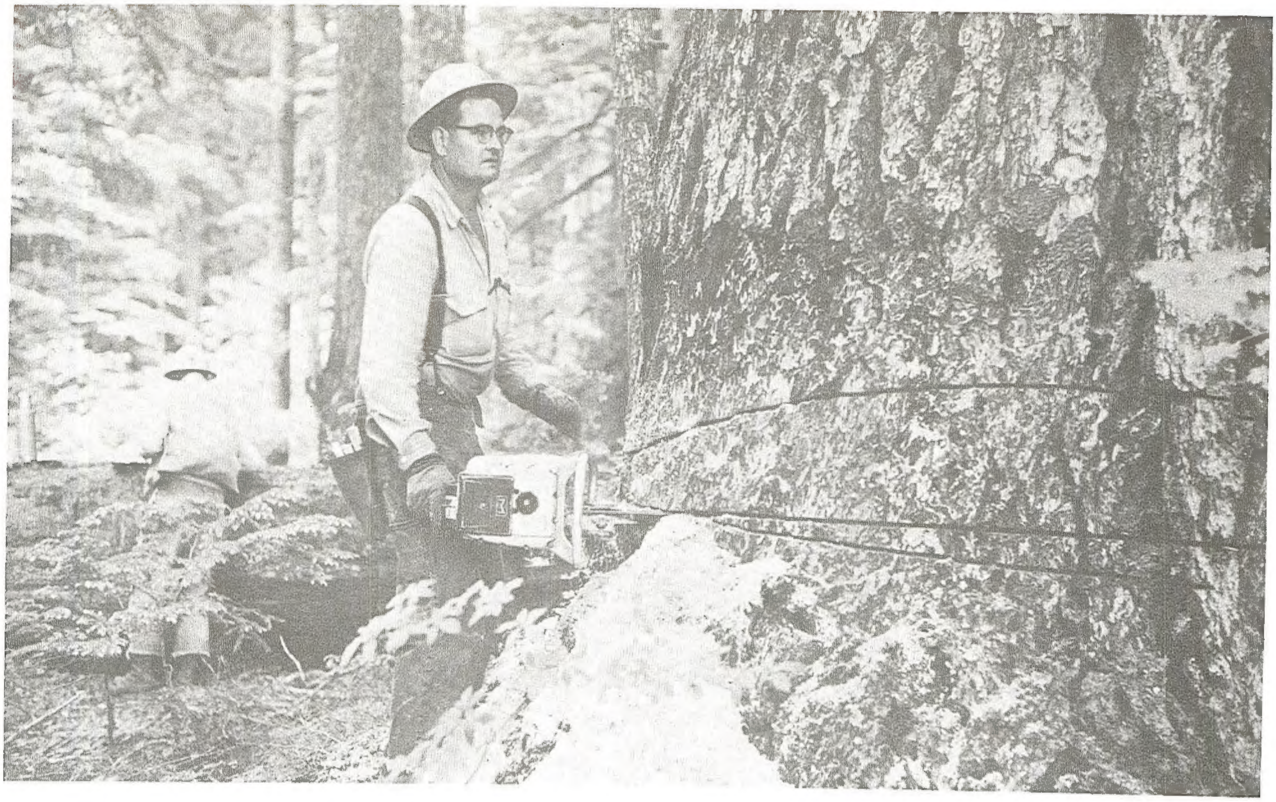


PHOTO I-11: Timber faller placing undercut in large, old-growth Douglas-fir.

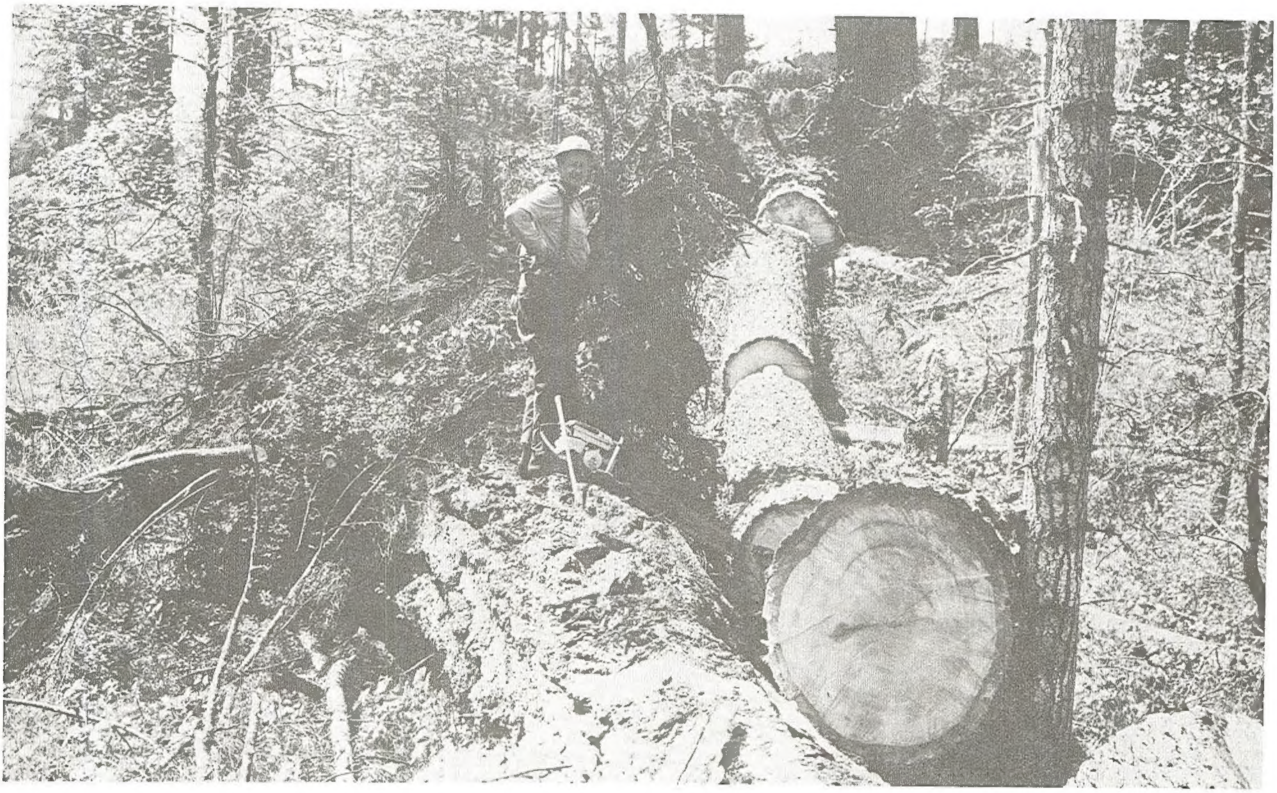


PHOTO I-12: Bucking tree into logs prior to yarding.

(a) Horse Yarding. Horses are still used advantageously in some situations. On suitable terrain they are well adapted to skidding small logs such as those produced in commercial thinnings. Horses can be used on narrow skid trails with minimum damage to the residual stand. They are best suited to skidding small logs downslope on gradients under 40 percent for maximum distances not exceeding 600 feet. Horse skidding will be carried out in the Black Hills' forests of South Dakota and in Montana to the extent of less than 100 acres a year. Use of horse logging is also being employed in western Oregon, primarily in commercial thinnings.

(b) Tractor Yarding (Photo I-13). Logging tractors are of two general types, crawler and wheel. The former has a metal tread while the latter is invariably mounted on rubber and are known as rubber-tired skidders. Both types are sometimes used with a mounted arch or to draw track-mounted arches or rubber-tired sulkies, devices which suspend one end of the log or turn of logs.

Both types of tractor are most effectively used for downhill skidding on slopes under 35 percent, and for maximum skidding distances of less than 1500 feet. Uphill skidding for short distances is feasible on gentle slopes, particularly for the larger crawler tractors. Often tractors complement other systems. A combination sometimes used on sidehill settings is downhill tractor skidding of the upper part and uphill high-lead yarding of the lower part to the same roadside landing. The present tractor skidding of almost two thirds of the acreage (one-third of volume) subjected to harvesting is expected to continue into the near future. It represents the predominant method employed in southwestern Oregon and the remaining forests in the contiguous states.

(c) High-lead Yarding (Figure I-7 and Photo I-14) Despite the increasing application of newer, alternative equipment, high-lead yarding remains one of the most important of the moving-cable systems. There are sound reasons for its popularity since many forested areas are too steep, broken or rocky for tractors. On clayey-type soils, tractor operations are frequently impossible during the long rainy season.

Rigged for use, the power source (yarder) is located at the landing near a vertical spar usually 80 to 120 feet tall. As a turn of logs is yarded by the mainline cable toward the landing, it is dragged full-length along the ground unless a stump or other obstacle is encountered. Then the vertical component of force on the mainline lifts the front end of the log(s) until it noses over or around the obstacle. Consequently, the high-lead system operates most smoothly and efficiently when yarding uphill. Downhill yarding is feasible, but logs tend to "hang-up" on obstacles and dig into the ground. When all logs within reach of the mainline are at the landing, it is moved laterally. The process is repeated in radial fashion, with the spar as a hub, until all desired logs in the setting have been moved to the landing.

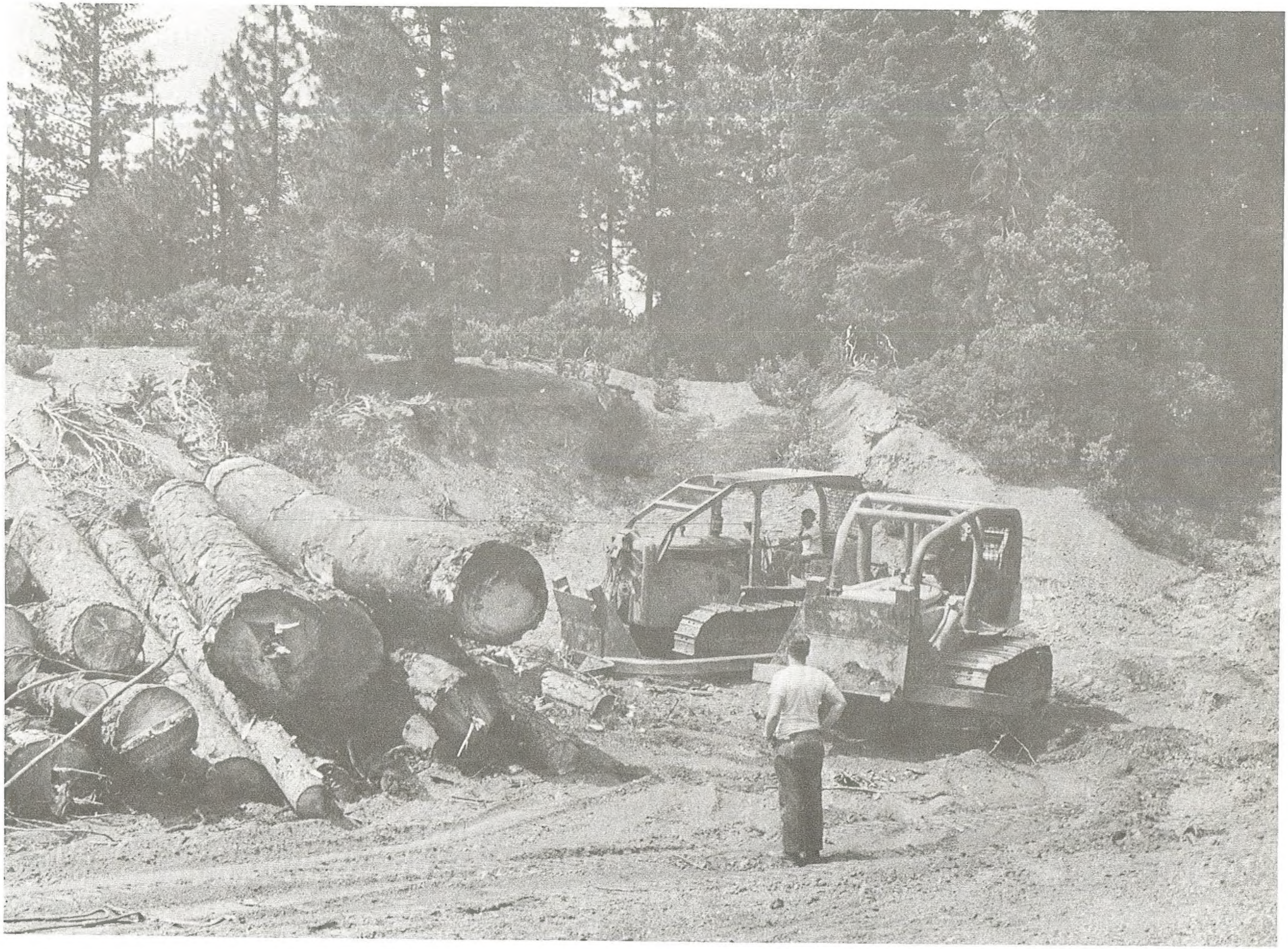
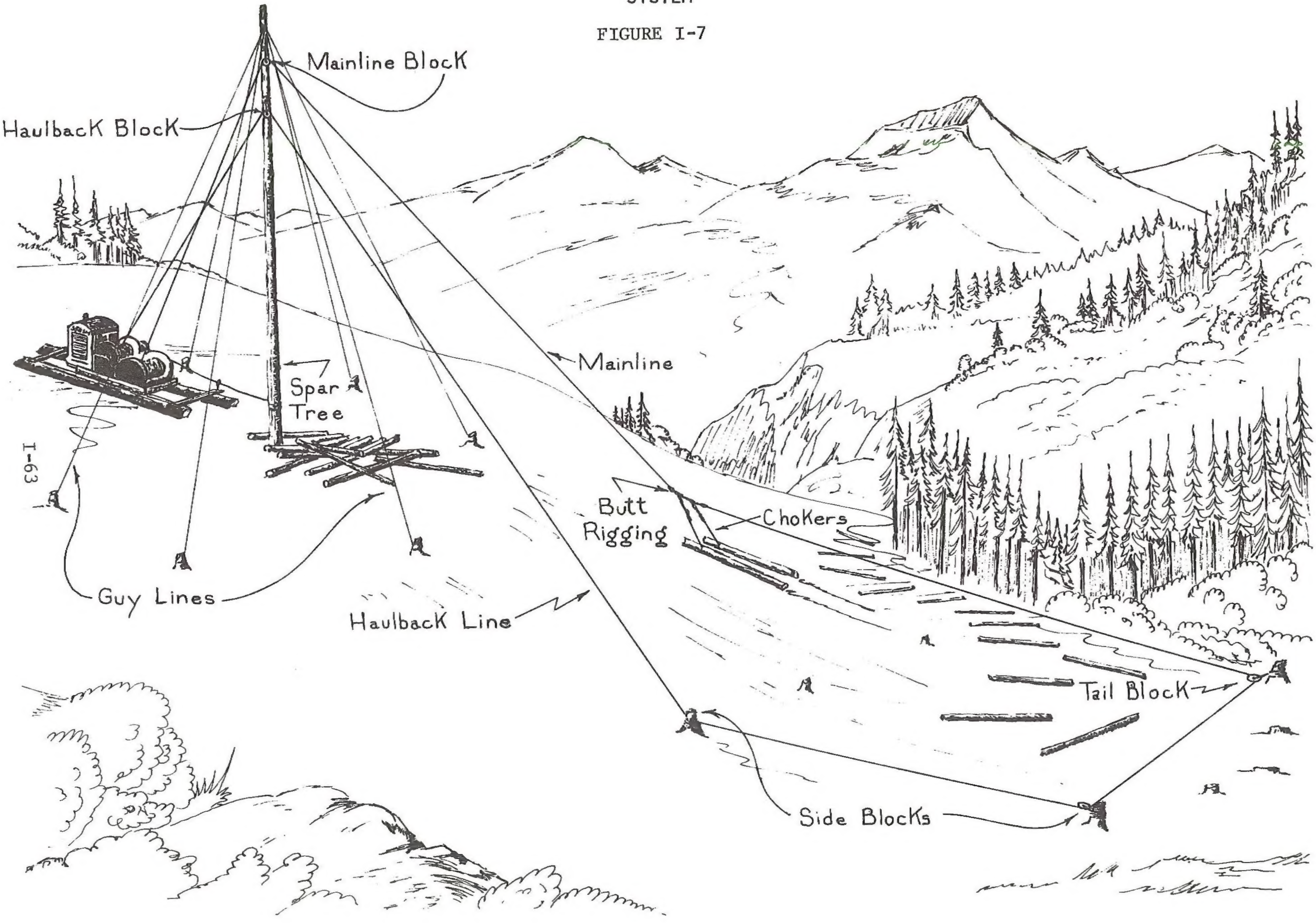


PHOTO I-13: Crawler-type yarding tractors. These tractors are used most effectively to yard or skid logs on slopes of less than 35 percent and up to distances of 1500 feet.

HIGH-LEAD YARDING SYSTEM

FIGURE I-7



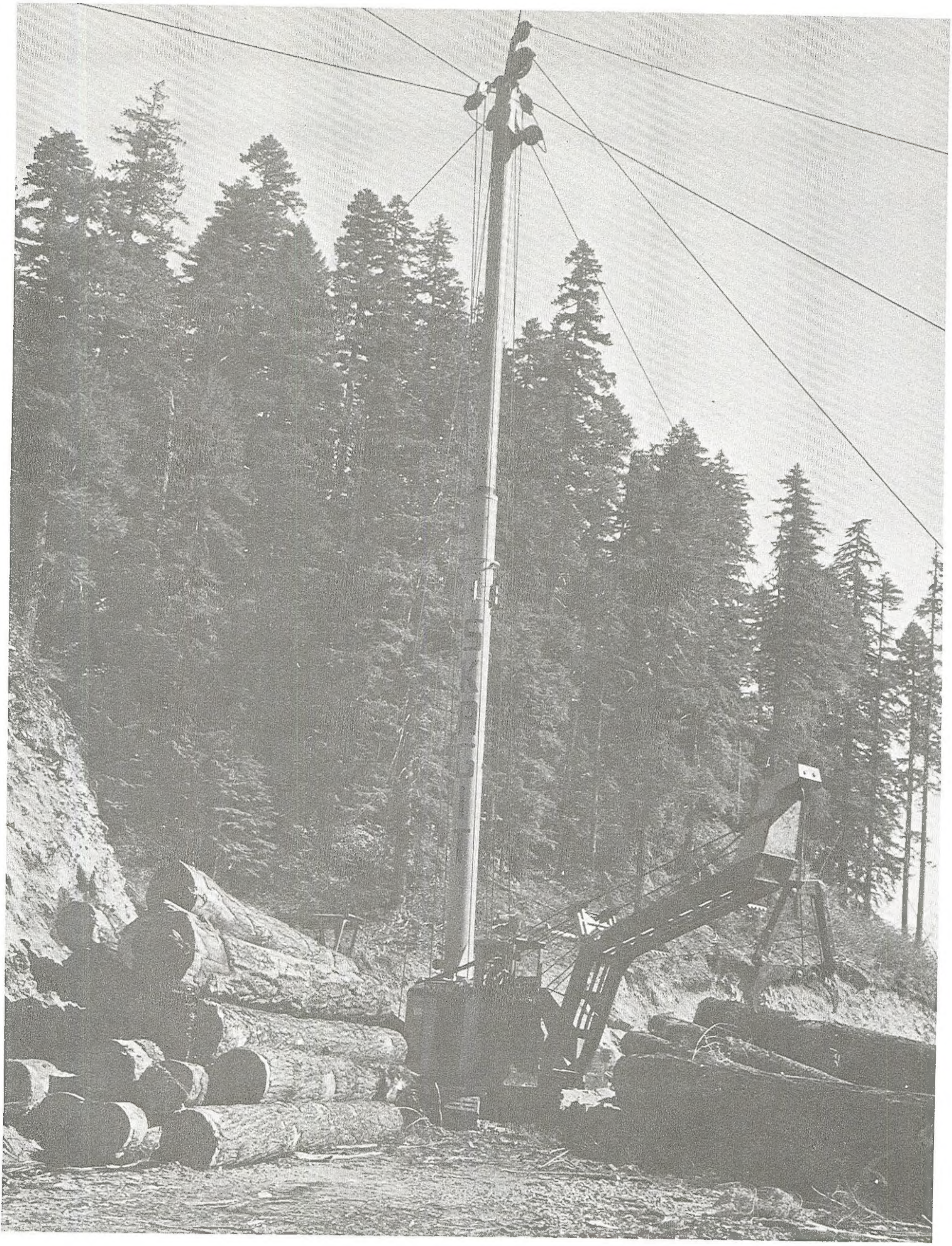


PHOTO I-14: High-lead yarding tower (behind) and heel-boom log loader (front).

The high-lead system is best adapted to yarding clearcut settings uphill with maximum yarding distance of about 800 feet as optimum although longer "reaches" are possible. With careful operation by a skilled crew, the system can also be used for logging such partial cuts as sanitation-salvage, shelterwood and selection cuttings. High-lead yarding will continue to be used on nearly one third of the acreage to be harvested and will be used primarily in northwest Oregon.

(d) Mobile Yarder-Loader Operations. [24, 25] Various methods of yarding are employed in situations where neither high-lead nor tractor logging is practical. The mobile yarder-loader is particularly adapted to removing small volumes of timber, operating in stands of low volume per acre, or operating in small timber on steep terrain.

While there are several variations of mobile yarder-loaders, they have certain common characteristics:

- All are self-propelled and can be driven from setting to setting (as opposed to most high-lead yarders).
- All are equipped with booms or spars which, when erected, provide lift for yarding and for loading trucks when lowered.
- Most have drum facilities which permit being used as high-lead systems.

Some of these machines can yard logs to a reach of 1,000 feet. However, under optimum conditions, maximum yarding distance usually is about 500 feet. Since they operate on the high-lead principle, mobile yarder-loaders are most efficient when yarding uphill.

These machines are well suited to logging commercial thinnings and sanitation-salvage, shelterwood and selection cuttings. A rather unique attribute is their capability to operate from an existing road, thus, eliminating the necessity of clearing and excavating landings. As each small setting below the road is cleared of logs, which are merely piled or "decked" along the road shoulder, the machine is moved a short distance along the road to its next setting. Mobile yarders represent the third leading logging method employed on Bureau-administered forests and will continue to be used, primarily in western Oregon (Photo I-15).

(e) Other Ground Systems. Jammers and selfloading trucks are sometimes used for yarding, principally in small logging operations.

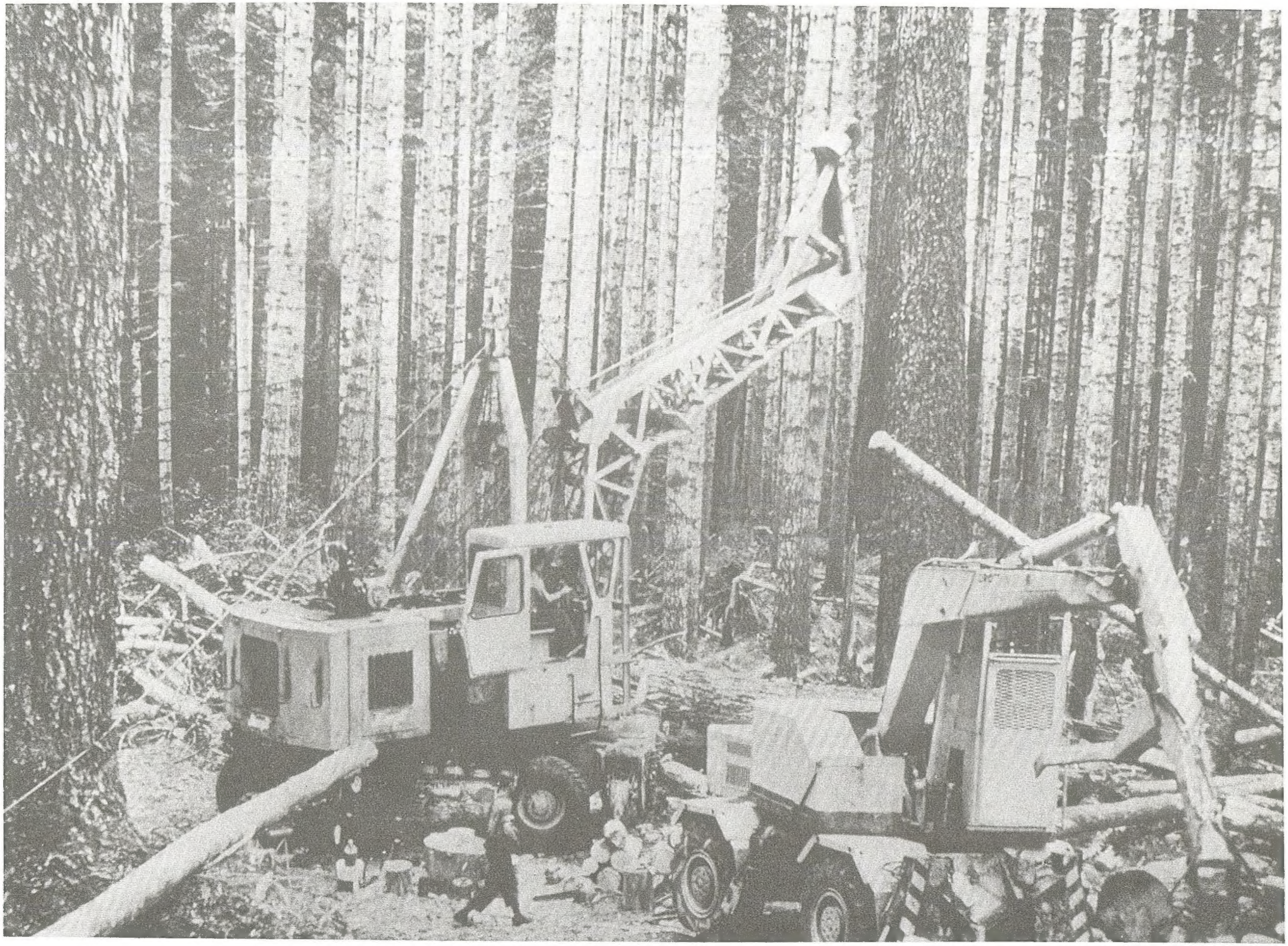


PHOTO I-15: Mobile yarder (left) and log loader (right). Mobile yarders are particularly adapted to removing small volumes of timber, operating in stands of low volume per acre, or operating in small timber on steep terrain.

- The jammer (usually a homemade machine) employs an erect boom and an engine-powered drum on which is wound a wire-rope cable used for both yarding and loading. While basically a machine for loading trucks, the jammer may be used for yarding logs for relatively short distances (usually not exceeding 300 feet). On slopes too steep for tractor operations, the jammer's limited yarding capability can be useful with a system of roads on contours spaced at slope distances of 600 feet or less. Jammer logging is relatively limited.

- The self-loading truck is commonly equipped with a short, horizontal boom with fairlead and cable wound on a drum and powered by take-off from the truck engine. Under favorable conditions, such trucks can yard logs from locations within 100 feet of roadside; however, their use is extremely limited on Bureau-administered forests. Both jammers and self-loading trucks tend to perform poorly as yarding machines because of low line speeds. Consequently, they are rarely used as such in operations requiring high-yarding production.

(2) Aerial Systems. These are capable of moving logs suspended above the ground from stump to landing. Suspension may be complete or partial; i.e., logs can be suspended free of the ground (known as "flying" the logs) or one end of the turn may drag. [26] Less than 10 percent of the acreage subjected to harvest is logged using aerial systems; however, the trend in their increasing use is expected to continue.

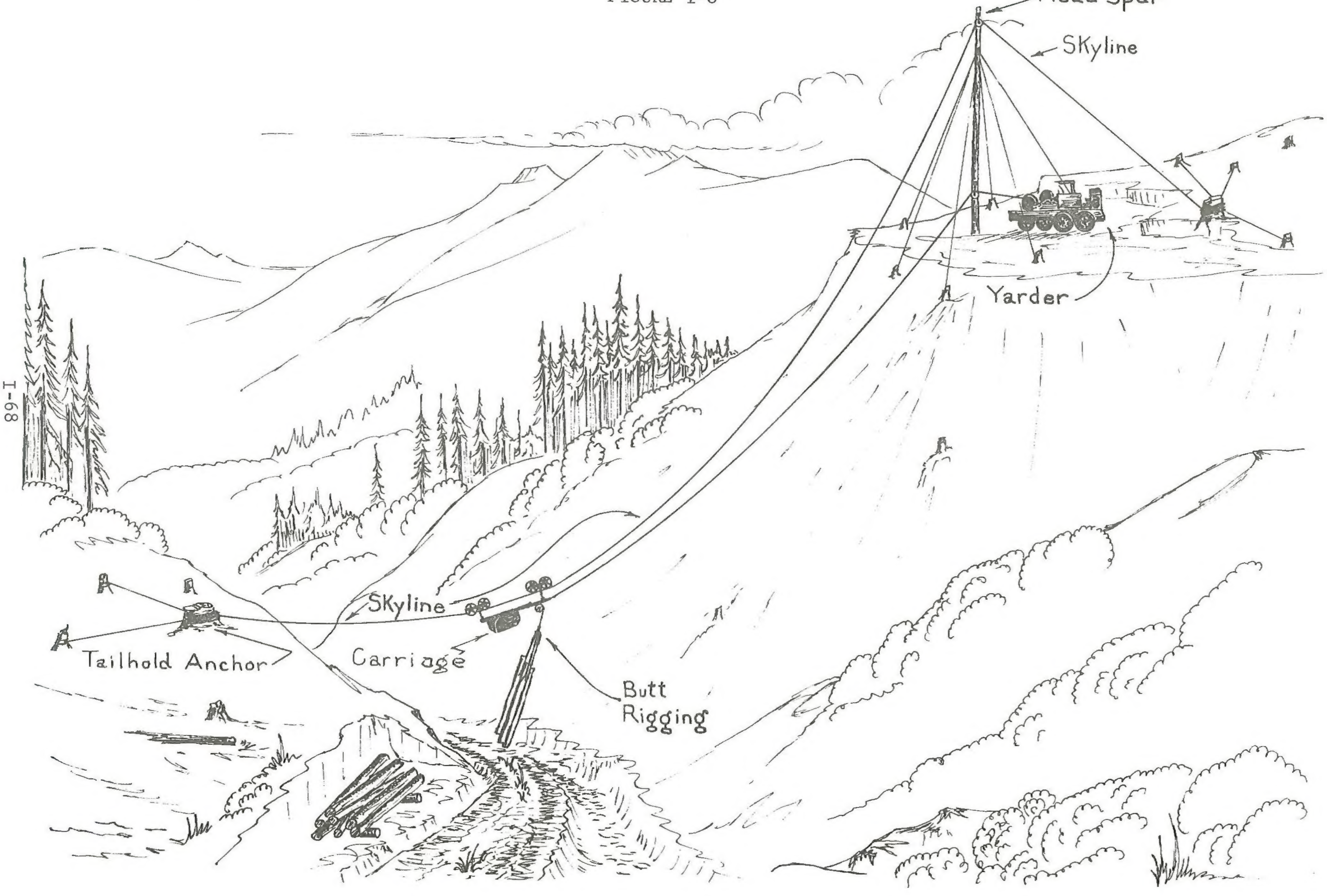
The three types of aerial systems currently operational are skylines, balloons and helicoprers; these are discussed separately.

(a) Skyline Yarding. Skylines are moving-cable systems which yard or swing logs suspended between a tail spar and a head spar. The basic principle of movement is via suspension from wire-rope cables. Modern skyline systems are mobile and have lateral yarding capability. The newer systems can be used for both uphill and downhill yarding. Some are readily convertible to conventional high-lead operation, a feature which increases their utility. Modern skyline systems are of these general types: standing or fixed skylines, slacklines, and running skylines.

- Standing (Fixed) Skylines (Figure I-8). The operating range of the larger, fixed-skyline equipment is very great; maximum yarding distances of 5000 feet are possible. This potential, properly utilized, can significantly reduce the road density which would be necessary for logging a given area by conventional means. The larger, standing-skyline equipment is best adapted to logging larger clearcut settings having large volumes per acre and in rough topography where the expense of developing intensive road networks would be prohibitive.

STANDING (FIXED) SKYLINE SYSTEM

FIGURE I-8



Smaller, fixed-skyline equipment with yarding capability of 1500 to 2000 feet is available. These machines and rigging are less costly and more flexible than the large skyline cranes. Properly used, they are adapted to some partial Properly used, they are adapted to some partial cutting as well as clearcutting. While they do not offer the road construction cost-saving potential of the larger skylines, they do have this advantage over the high-lead and tractor systems.

- Slackline (Live) Skylines. These use a yarder with brake-equipped skyline drum. In operation, the skyline is raised off the ground by winching in on its drum, the brake is set to hold the skyline in position, and the haulback line places the carriage over the logs to be yarded. The brake is then released and the skyline lowered until chokers can be set on the turn of logs. Then the skyline is raised until the turn is at the required elevation, the brake set, and the carriage and attached logs yarded to the landing.

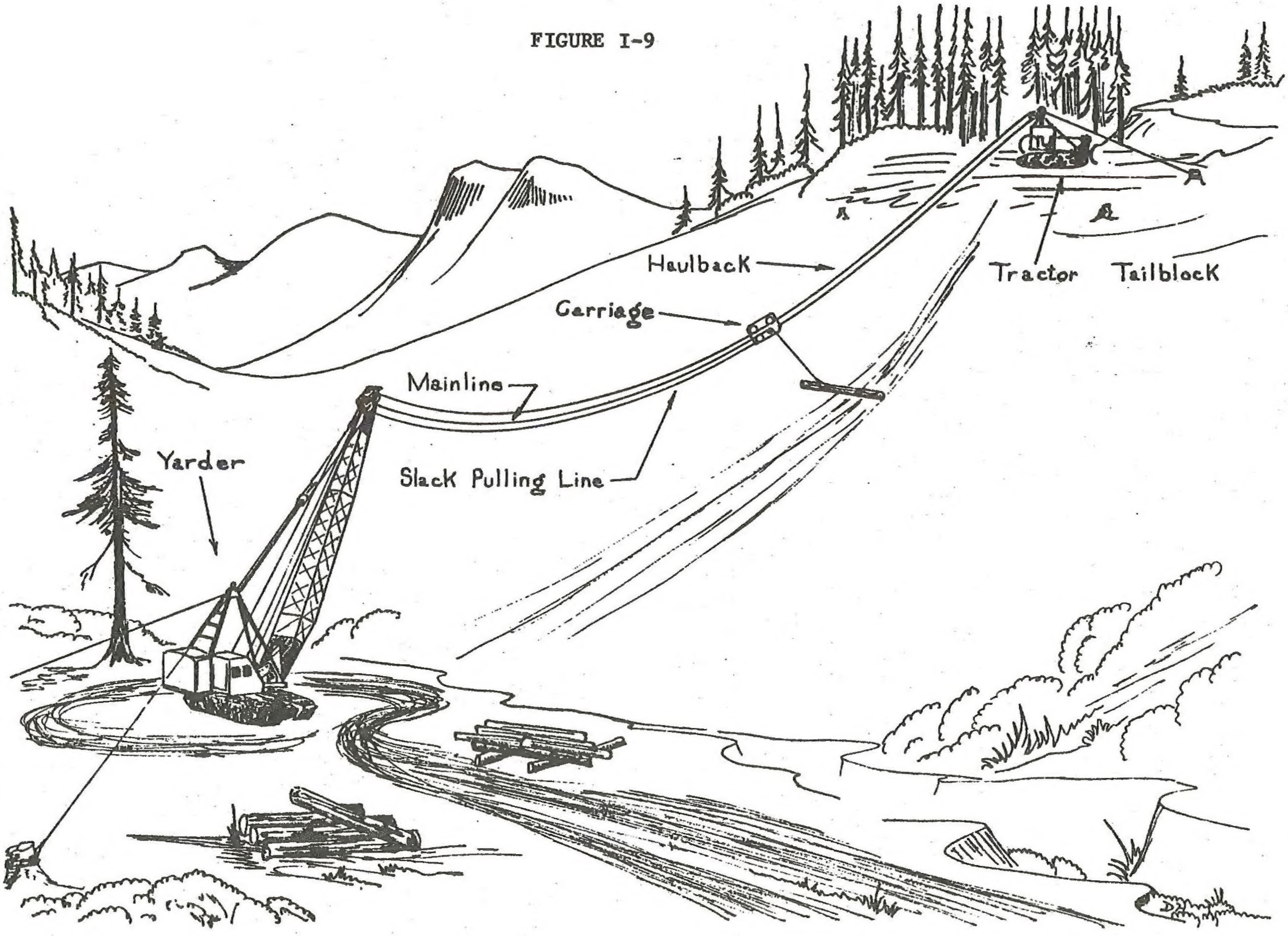
  Commonly operating on a reach of 1,200 to 1,600 feet or more, slacklines have capabilities and applications comparable to those of the smaller, fixed-skyline systems.

- Running Skylines (Figure I-9). These are the most recently developed of the skyline systems. They are becoming widely used in the northwestern United States and are replacing standing skylines, and high-lead in some applications.[27] A past disadvantage of these systems has been a rather short span capability (reach) of about 1,000 feet. However, yarders with reaches exceeding 2,000 feet are now available.[28] The running skyline is particularly well suited to yarding intermediate cuttings and harvest cuttings of a partial nature where damage to trees left standing must be minimized. Properly equipped and utilized, running skylines may yard clearcuttings as effectively as as the high-lead.

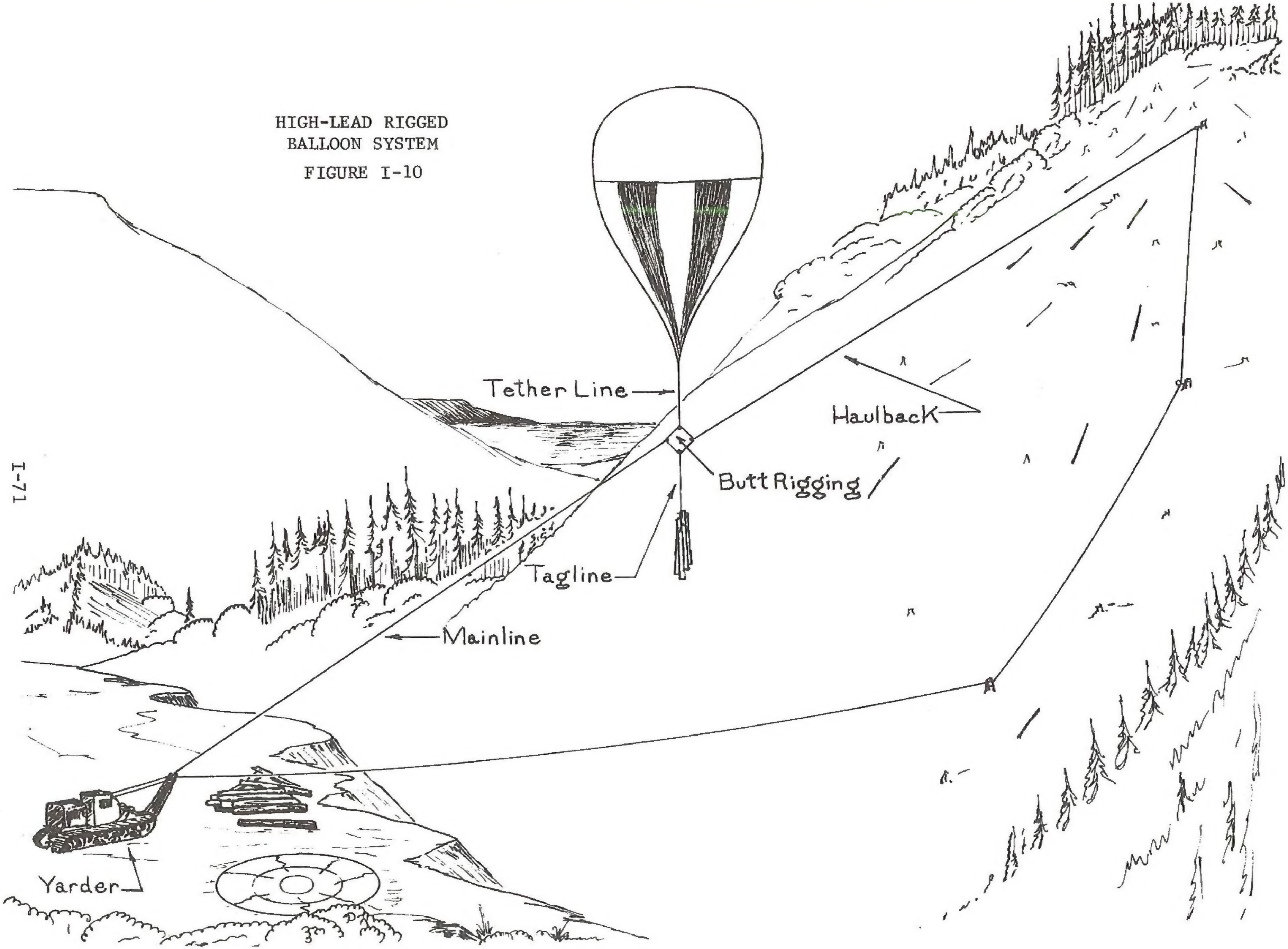
(b) Balloon Yarding (Figure I-10). Despite rather wide publicity, balloon logging has had only limited use to date. The few American balloon-logging operations conducted to date have probably been economically marginal. Applications in coastal British Columbia have been more successful. Currently less than 100 acres a year have been balloon logged on Bureau-administered forests in western Oregon. Balloon systems, which lift logs completely off the ground, have yarded for distances exceeding 5,000 feet although 3,000 feet might be considered optimum.[29] Balloon systems are more expensive to operate than skylines because of additional costs of the balloon, its accessories, and gas for inflation.[30] Other advantages are instability of the

RUNNING SKYLINE SYSTEM

FIGURE I-9



HIGH-LEAD RIGGED
BALLOON SYSTEM
FIGURE I-10



balloon in moderate to strong winds, adverse reactions of the balloon to temperature extremes, and gas leakage. The increased expense of balloon logging may be economically justified where terrain and limited road access preclude logging with other systems.

Presently, balloon yarding appears to be best adapted to clearcuttings because of the difficulty of controlling the balloon in side winds and resulting lateral movement of the butt rigging and its suspended turn of logs which can damage reserved trees in a partial cut.[31] Experience indicates, however, that the balloon can be used successfully to remove the overstory of a two-storied stand.

(c) Helicopter Yarding. Helicopter logging applications are in the formative stages. The very high unit cost of yarding with helicopters is the primary factor now limiting the use of these machines. However, high-performance helicopters capable of lifting maximum loads of 20,000 pounds (approximately 2500 bd. ft.) are available for logging.

In a well-planned helicopter logging operation, one-way flight distances should range from 1300 to 8000 feet.[32] The logs are hooked to a tag-line 100-200 feet in length which is suspended from the helicopter. The helicopter then climbs vertically to clear obstructions before moving toward the landing.

Areas to be partially or selectively logged can be yarded by helicopter in cases where the surrounding trees or residual stand are not exceptionally tall. The removal of overstory timber to release young trees may present good opportunities for helicopter logging.

c. Transportation Systems

The primary purpose of transportation in the context of timber management is to provide a medium for moving logs from the landing or loading site located in the cutting area to a market destination which may be a few miles to a 100 miles distant.[33] The major mediums currently in use are land transportation and water transportation. The former consists of hauling the logs over a road and/or railroad system while the latter involves the utilization of water to transport the logs. Since rail transportation is not used in moving logs on Bureau timber sale areas (and does not appear to hold promise in the future), it will not be discussed.

Water transportation includes the floating, rafting, or barging of logs on such natural waterways as rivers and lakes (Photo I-16). Currently, this method of transportation is not used in moving logs from Bureau-administered lands, with the exception of some isolated instances in interior Alaska. If the timber resource of interior Alaska

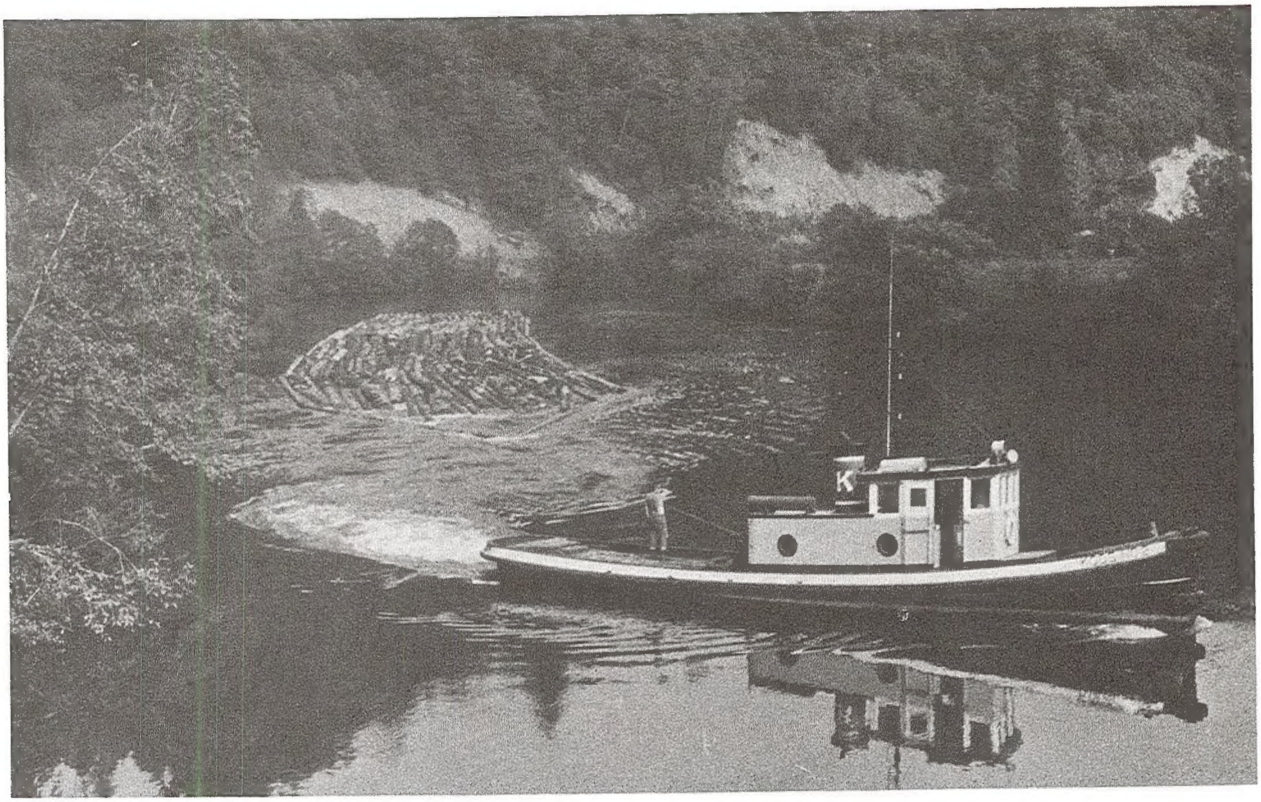


PHOTO I-16: Log rafting. If the timber resources of interior Alaska is subjected to any significant commercial development in the future, the rivers may become the major means of log transport.

PHOTO I-17: Log hauling over forest access road. This method constitutes the principle means of transporting logs from the woods to the utilization center.

is subjected to any significant commercial development in the future, the rivers may become the major means of log transport. However, because of the many uncertainties involved, water transportation will not be discussed further in this statement. Related to this matter is the use of water to store logs somewhere enroute to a manufacturing facility. At the present time, the Bureau is involved with only one log storage dump, located on the Smith River in western Oregon. Since an environmental impact analysis has been made of this operation entitled "Operations of the Smith River Log Dump as Related to Water Quality and Aquatic Resources," October 1972, it will not be included in this statement.

The dominant transportation medium currently in use is the hauling of logs by trucks (Photo I-17) over roads. Because of the intermingled ownership pattern, the development of the road system often requires cooperation with adjacent landowners to insure access to the county, state and federal highways that lead to the manufacturing centers. While the Bureau roads serve other forest values and uses, the initial cost of their construction and maintenance is usually carried by the timber sale contract. Consequently, in these instances, the time of construction is scheduled in conjunction with the sale of a given tract of timber. Following the completion of road construction, the roads can be used jointly for protection and other activities associated with the timber management program in addition to timber harvest activities.

The width of forest access roads varies with the type of use, topography and other variables; however, in general, they range from 14 to 20 feet in usable width and 40 to 100 feet across the cleared area (roadbed, ditches, cut and fill slopes, shoulders, etc.). Not all roads are part of the permanent road network. Some are used for a short period of time and then put-to-bed. Current plans call for the construction of approximately 500 miles of road a year, 400 of which will be located in western Oregon.

The operational practices associated with the development of the transportation system are included under the construction and maintenance phases and will be discussed on that basis in the following subsections.

(1) Construction. This phase includes all the practices followed from the initial entry of equipment on the road location site to its availability for log hauling. The construction phase involves the movement of a portion of the earth's surface from one location to another and, in its new position, creation of a desired shape and physical condition which will serve the purpose for which the road is built. While roads are of varying standards and specifications, the practices set forth are characteristic of those employed on Bureau-administered lands.

Basic construction operations are clearing and grubbing, excavation, formation of embankments, finishing, and addition of bases and surfacing courses and structures. Any or all of these operations may be performed on a given road project at the same time and may overlap to a certain extent.

(a) Clearing and Grubbing. Clearing refers to the removal of trees, brush, and debris from within the designated limits of the road's location. Grubbing refers to the removal of roots, stumps and similar obstacles to a nominal depth below the existing ground area. Frequently, clearing and grubbing comprise a single operation and may include the removal of topsoil to a shallow depth. Felling of small trees and uprooting of stumps are usually done by a bulldozer; the operation may also involve the use of explosives and other equipment.

(b) Excavation.[34, 35] This practice refers to the removal of natural material from its resting place and transporting it to a different place through an earth-moving operation. It normally constitutes the major part of the road construction operation and is carried out in conjunction with the installation of such structures as culverts, drainage pipes and bridges. Excavation may be classified by the type of material excavated, as follows:

- Topsoil excavation is removal and stripping of the exposed layer of the earth's surface.
- Earth (or common) excavation is removal of the layer of soil under the topsoil and on top of rock. Earth can be broken down for ease of handling by plowing and ripping and is usually moved easily by scrapers or other types of earth-moving equipment.
- Rock excavation is the breaking down of a formation by systematic drilling and dynamite blasting, or by ripping with heavy equipment, for ease of removal by rock-hauling equipment.
- Muck excavation is removal of soil that contains an excessive amount of water. This material is usually unstable under loading and undesirable as an embankment material.
- Unclassified excavation is done without regard to materials encountered and may be any combination of topsoil, earth, rock and muck.

The equipment most widely used in excavating work is a wheel or track (crawler) type tractor with a steel blade that can be raised and lowered. Equipped in this manner, a tractor can push material from place to place and shape the ground. Tractors can also be attached to scrapers for excavation and short hauls; however, trucks or self-propelled scrapers are usually used when earth is to be moved any distance.

(c) Embankment. This practice involves the construction of roadway embankments, including preparation of the areas upon which they are to be placed; the construction of dikes within or adjacent to the roadway; the placing and compacting of approved material within roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the roadway area. When available excavation material is not sufficient for the embankments, borrow material from outside must be brought in.

Embankments are constructed in layers, the thickness of which varies. Compaction of each layer is by steel rollers, rubber-wheel rollers, sheepsfoot rollers, or other similar equipment which may be self-propelled or towed by a tractor.

(d) Finishing. This practice is performed primarily by a motor grader and includes such items as trimming and finishing of slopes and the fine grading operations required to bring the subgrade to the final desired elevation.

(e) Base and Surface Courses. This treatment consists of all or part of a flexible pavement which is usually made up of a wearing surface, base and subgrade. The wearing surface is usually made up of a macadam, bituminous surface treatment or gravel surface and must withstand wear, abrasion and displacement from vehicles and prevent water from entering the base of the roadway. The base is usually constructed of gravel or crushed rock which is of high stability and density. The subgrade is the natural earth surface. Usually it is the compacted soil in a cut section or the upper layer of an embankment section. Rock for use in the base and surface course is obtained from nearby quarries or crushing plants.

(f) Structures. These consist primarily of bridges, culverts, cattleguards, fences, retaining walls, guardrails and riprap. These structures may require excavation, embankment, concrete work, backfilling, or other construction operations.

(2) Maintenance[36-39] This phase includes the necessary repairs to keep a road in a safe, serviceable condition for use by logging trucks and passenger cars. These repairs include blading road surfaces, replacing and patching road surfaces, cleaning and replacement of culverts, cleaning ditches, replacing traffic signs, repairing bridges, brush and snow removal, slide removal and repairing settlements and washouts. Many of these repairs are necessitated by sudden failures, damage by storms, gradual deterioration, and occasional obstructions.

(a) Surface Maintenance. Dirt road maintenance consists primarily of blading, leveling and cleaning out of the side ditches and culverts.

Gravel roads, which are untreated, may require a heavy blading of the surface and cleaning of ditches in early spring and late fall. Heavy rains may cause rutting and require the addition of gravel and additional blading. Road mix and macadam surfaces require patching of holes, ruts, unraveled areas, and renewal of the surface periodically by application of a seal coat.

(b) Shoulder, Sideslope and Roadside Maintenance. This maintenance consists of erosion control and brush control for visibility protection. The erosion control is accomplished by seeding and mulching and other soil stabilization practices. Brush control is accomplished by cutting back (or chemically treating) weeds and brush which obscure visibility and interfere with drainage.

(c) Drainage Maintenance. This is accomplished by removing debris from culverts, correcting erosion by use of rock backfill, repairing eroded ditches with rock material, and riprapping areas eroded by stream action. This also includes repairs to bridges and small structures.

(d) Safety Maintenance. This includes sanding icy sections, replacing signs and protective barriers in order to preserve safety features of the original construction, dust prevention by spreading oil or water, debris removal, and some limited snow removal.

F. Interrelationships with Other Programs

The Bureau of Land Management administers approximately 470 million acres of national resource lands, located primarily in the western United States, including Alaska.* These lands include a diversity of resource values and uses such as wildlife, livestock grazing, timber, minerals, water, recreation, and cultural sites. Additionally, the Bureau has certain responsibilities in the management of the mineral resources on other federal lands, private lands where the federal government has retained subsurfaces rights, and the outer continental shelf.

The national resource lands are managed under the principle of multiple-use consistent with the many laws, statutes and regulations governing the protection and development of the nation's resources thereon (Chapter I, B). To help meet its legislative requirements, the Bureau utilizes a systematic process for the development of land-use plans on which individual resource programs are based. These programs relate to wildlife habitat improvement, protection of rare and threatened species, preservation of historical and archeological sites, timber production, environmental protection, the use of off-road vehicles, construction of recreational sites and facilities, watershed development projects, road construction and access acquisition, fire protection, soil conservation, mineral exploration and development, wild horses and burro management, livestock grazing and others. While most of the programs are not simultaneously carried out on the same acre of ground, many are often carried out simultaneously in different parts of a relatively small area. Quite often many of these programs are compatible with one another. In other instances they are in conflict, thereby, requiring the exclusion of one or more potential programs in deference to a higher priority program. Priorities, in turn, are based on public needs and specific legislative mandates. An overriding consideration in determining the appropriate program or mix of programs to be carried out and how they are to be carried out on a particular area is the protection or enhancement of such basic environmental components as soil, air and water.

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* Refer to Appendix F for history of National Resource Lands, organizational structure and history of timber management program.

All of the foregoing factors directly affect the shape and magnitude of the timber management program since forested lands provide many of the necessities or amenities that society demands in addition to those associated with the production of wood. The forested lands under the Bureau's administration are particularly significant in terms of scenic values, recreational opportunities, wildlife, watersheds, and providing habitat for certain endangered and threatened species. The timber management program reflects these and other values because of their consideration both in determining what lands are to be available for the production of wood and the manner in which the timber management practices are to be carried out. Consequently, timber production is only one of the many resource activities that comprise an integrated forest management program.

Another dimension to the planning and implementation of the timber management program involves coordination with other federal agencies, state and local governments, and the private sector. This is particularly essential due to the intermingled ownership pattern which characterizes the areas where the national resources lands are located. Most of the adjacent lands, particularly in western Oregon, are in private forest holdings which are subjected to a diversity of timber management practices consistent with individual or corporate objectives and policies. The actions taken by the private sector on their lands can have a significant influence on the resources found on the national resource lands and contribute to the cumulative impact of timber management on a given watershed or area. Consequently, cooperation and coordination between the Bureau and the appropriate parties is sought in the course of planning and carrying out the Bureau's program.

Joint planning is also carried out where national resource lands are adjacent to national forests or state forests. The three public ownerships generally have comparable timber management programs since they are managed under the principles of sustained-yield, multiple-use and environmental protection. Current national cooperative agreements reements between the Bureau and Forest Service relate to matters that include pest control, fire control, forest insect and disease surveys, land withdrawals and forest roads, integrated timber sales and road maintenance and construction. Regional plans developed by state, local or other entities are also utilized in the formulation of the many diverse but interrelated resource programs carried out on Bureau-administered forests.

In addition to planning, the Bureau consults, contracts and coordinates a variety of research efforts with private organizations, states, universities and other federal agencies. U.S. Forest Service research efforts in forest development and forest management and logging are relied upon heavily in maintaining a progressive and modern forestry program. Contracts with universities also provide valuable research data in resolving problems of a "local" nature.

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II. DESCRIPTION OF THE ENVIRONMENT*

A. Geographic Location

The Bureau's timber management is limited to the Coniferous Forest Biome, which generally extends from the western edge of the grasslands in the Great Plains to the Pacific Ocean, including the major part of Alaska. A biome may be defined as a major biotic community, that is, natural groups of organisms characterized by the occurrence of certain plants and animals which are dominant and influential.[1] International Biome Programs have been initiated to analyze basic ecosystems and, among other goals, to establish a scientific base for programs to maintain or improve environmental quality.[2] Sharp demarcation lines between biomes have not yet been developed. Therefore, to utilize the basic advantages of the biome approach, and collect, analyze and recommend on the numerous effects of timber management, organizational biome boundaries will include both aquatic and terrestrial communties.

The Coniferous Forest Biome represents a diversity of environments, species compositions, soils, resource products and land uses under greatly varying climatic conditions. This Biome has been broken down into three sub-biomes in an attempt to delineate and further homogenize the many environmental variations within the coniferous forest.

These sub-biomes are as follows (see also Figure II-1):

- Taiga Coniferous Forest. This forest spreads across interior Alaska with narrow fingers following waterways into the Arctic.
- Montane Coniferous Forest. This forest generally extends eastward from the crest of the Cascade Mountains to the eastern foothills of the Rocky Mountains and southward from Canada to Mexico. At approximately 43 degrees N latitude, it extends westward into southwestern Oregon to include all but the western slope of the Siskiyou Mountains. From the Siskiyous it extends southward encompassing the Klamath Mountains and east slopes of the Coast Range of California.
- Northwest Coastal Forest. Primarily a rain forest, it generally extends southward along the Pacific Coast from southern Alaska through western Washington and Oregon and eastward to the crest of the Cascade Mountains. At approximately 43 degrees N latitude, it constricts to a much narrower band along the west slope of the southern Oregon and California Siskiyou and Coast Range Mountains.

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* Consistent with Departmental and Bureau Manuals, this chapter describes the environment as it exists today. However, since timber management has been an ongoing Bureau program for several decades, it reflects, (in part) the effects of the program and, therefore, does not fully comply with the requirement that the existing environment be described without the action. The additional requirement for describing the probable future environment without the action is met in Chapter VIII, Alternatives, where the no timber management program is discussed.

CONIFEROUS FOREST BIOME

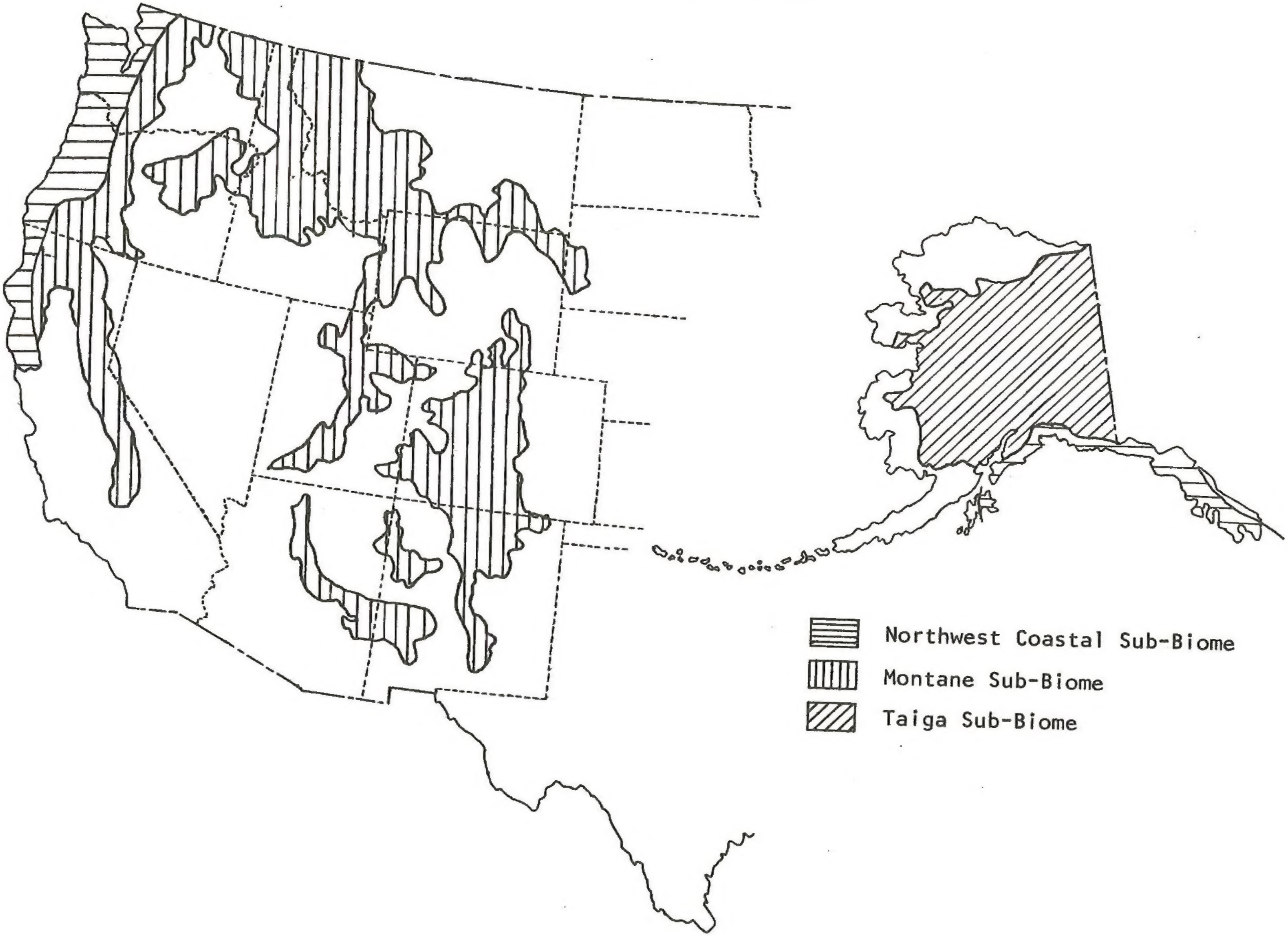


FIGURE II-1

For each component of the environment described in the parts that follow, the various characteristics common to all three sub-biomes (the Coniferous Forest Biome) are discussed; and, also, the characteristics unique to a particular sub-biome are described when applicable.

B. Ecological Interrelationships

A description of the ecosystem must concern itself with the forest as a biological community, with the interrelationships between the trees and other organisms comprising the community, and with the interrelationships between these organisms and the physical environment in which they exist.[3] In order to systematize the description of the forest ecosystem, the physical environment and the biotic community will be briefly discussed separately in the first parts that follow. However, it should be understood that these components of the ecosystem are not independent but rather interdependent and interrelated influences that must in the final analysis be considered together, as they will be in the later parts.

1. General Physical Environment

The physical aspects of the forest ecosystem constitute the sum total of the atmosphere, soil and water components, each of which contributes to sustaining the life of the biotic community. In the case of vegetation, the plant grows with its crown in the atmosphere and its roots in the soil. To the crown comes the warmth, light, carbon dioxide and oxygen; and to the roots come the mineral nutrients and water necessary for the life processes. Their availability depends upon an endless system of changing climate, day length, and soil development - changes that are in part related to the developing vegetation itself.[4] The physical factors that affect plant and animal life can be divided into broad groups as follows:

- Above the surface. These climatic factors include solar radiation, precipitation, air temperature, air humidity, wind, lightning, and carbon dioxide content of the air.

- Below the surface. Geologic and soil factors include the nature of the parent material, the soil profile, physical and chemical soil properties (temperature, oxygen content, calcium and pH relationships) and soil moisture relationships.

- On the surface. Includes the land forms and the standing or running water which provides nutrients and the immediate physical environment for aquatic plants and animals.

2. General Biotic Community

The forest is made up of organisms, both plant and animal, mutually occupying a complex of environments which are dominated by trees and other woody vegetation. All of the organisms are in competition for the physical components of light, air, water, warmth and nutrients necessary for life.[5] Each in its turn creates part of the environment affecting the others. These organisms can be classified in terms of the basic functions they perform in the community:

- Producers. These are largely the green plants that assimilate the nutrient minerals by the use of considerable energy and combine them into living organic substances. They include flowering plants, gymnosperms, mosses, ferns, liverworts, multicellular green algae, and red and brown algae.

- Consumers. These are chiefly animals that eat and digest organic matter, releasing considerable energy in the process. They include mammals, birds, reptiles, fish, insects, roundworms, flatworms, and parasitic fungi and bacteria.

- Reducers. These are chiefly bacteria and fungi that return complex organic compounds to the original abiotic mineral condition, thereby releasing the remaining chemical energy. These include micro and macro-organisms such as millipedes, earthworms, mites, fungi and bacteria.

3. Typical Coniferous Forest Biome Ecosystem

Combining the physical environment with the biotic community, the forest ecosystem becomes a complex of trees, shrubs, herbs, bacteria, fungi, protozoa, arthropods, other invertebrates of all sizes, sorts and description, vertebrates, oxygen, carbon dioxide, water, minerals, and dead organic matter that in their totality constitute the forest.[6] The ecosystem is constantly changing diurnally, seasonally, and over the long-term climatic cycles. Change is perpetual and goes on at a rapid or gradual rate, depending upon the rate of changes in the climate, the soils, the land forms, the fire history, and the biotic composition of the ecosystem.[7]

When the environment changes as a result of the actions of organisms so that there is an increase in soil fertility, decrease in light intensity, or some other modification, conditions may become more favorable for some other species than for those already present. There may then be a replacement of one species by another or of one community by another, and this second community may be replaced by a third, and so on. Thus, succession of easily recognized stages takes place in the development of a climax community. This final stage or climax tends to persist as long as there is no change in climate or as influenced by the actions of man.[8]

The interrelationships between and within the physical en-vironment and the biotic community can be described in terms of the following integrated processes, each of which is vital to sustaining life in a forest, and in turn its value to the public.

a. Nutrient Cycle

Vegetation is the basic nutrient producer since, through the process of photosynthesis, it converts inorganic chemicals to a simple form of sugar known as glucose. Using water and minerals from the soil, carbon dioxide from the air, and sunlight, this process links nearly all living organisms with the sun, the earth's ultimate source of energy. A by-product of this process is oxygen. By means of further chemical changes, all of which take place in plants and some of which take place in animals, the basic sugar is converted into more complex carbohydrates, proteins, fats and other substances that support life.[9]

These nutrients, as well as others, continuously circulate through the ecosystem following fixed patterns or cycles, and in the process are made available in various forms to animals. The plant-eating animals constitute the first order of consumers, some of which are subsequently consumed by predatory animals or victimized by parasitic animals, who in turn may be consumed by scavengers. When plant litter, averaging 3000 - 5000 pounds per acre annually, or plants and animals die and fall to the forest floor, the billions of reducers convert their remains into inorganic substances. These include nitrogen, phosphorous, potassium and calcium which are the chemicals most often in short supply in the forest soil.[10] They are then, along with others, taken up by the plants through the root system, with the assistance of mycorrhizal-forming fungi, thus beginning the cycle again, or are stored in the soil. Nitrates, if not recycled through the plants or stored in the soil, are denitrified and the nitrogen is returned to the atmosphere where it is available to nitrogen-fixing plants such as certain species of algae.

Forests are unique compared to other biomes in that a large amount of nutrients is stored in the trees for relatively long periods of time prior to being made available for recycling. Forest ecosystems cannot be patterned as typical food chains; trees are not usually pala-table. Under natural conditions they are decomposed by micro-organisms or destroyed by fire. In managed forests, they are removed to a great extent from the system by man's activity.

b. Energy Flow

The transmission of energy through the forest ecosystem is closely correlated to the nutrient cycle. However, unlike nutrients, energy is not recycled. Virtually all energy enters the biotic community as sunlight, but only 1 percent of the light that falls on the forest is transformed by green plants into the chemical energy of food. The remainder is reflected from the leaves, transmitted through them, or dissipated as heat.

Food manufactured by green plants is subsequently passed through the tissues of the plants, plant-eaters, predators, scavengers, parasites, saprophytes, and other consuming and decomposing forms of animal life. In each group, some of the food is used to build tissue and some as fuel for the bodily processes of growth, reproduction, and movement. The chemical energy of the food fuel is converted, through respiration, to heat energy that is lost to the air. Some energy is also lost in food eaten by foraging animals that do not live in the forest, by animals that leave when mature, by fires, and by the removal of vegetation and game animals by man.[11]

Once energy is transformed from a stored form (in food or body tissue), to some active form (heat), it dissipates in the atmosphere and is lost to the biotic community. Life continues by virtue of the con-tinuous influx of new energy as a result of solar radiation.

c. Hydrologic Cycle

Both the nutrient cycle and the energy flow depend in large measure upon the water cycle which controls the availability of nutrients to plant roots, their rate of movement through the plant, the conditions under which plant litter is decomposed, and the development of the soil profile which affects the availability of nutrients to the plant roots as recycling is initiated.[12] Thus, the hydrologic cycle constitutes a vital part of the forest ecosystem in supporting vegetation and, in turn, the entire biotic community.

The cycling of water in the ecosystem consists essentially of precipitation inputs from the atmosphere, runoff outputs in the form of streamflow, and a series of intermediate processes influencing the magnitude of the precipitation/runoff relationship. These include interception, infiltration and percolation through the soil, evapotranspiration, surface runoff and storage at various levels of the system. Consequently, the nature of the biotic community is both a function of the hydrologic cycle and, in turn, a major influence on it.

d. Ecological Variations

The foregoing physical and biotic components of the forest ecosystem and their basic interrelationships are common to the entire Coniferous Forest Biome. However, because of regional differences, primarily climatic, their makeup or nature varies between sub-biomes and warrants discussion.

- Taiga Coniferous Forest. Due to low temperatures and a short growing season, the Taiga is the least productive in terms of the biomass of the biotic community. Despite long summer days, the annual growth rate of vegetation is low and regrowth when disturbed can be extremely slow. Temperature exerts such a powerful limiting effect that only a relatively few kinds of organisms have successfully adapted to far northern conditions.[13] Thus, the entire living part of the ecosystem is built around relatively few species.

Basic relationships are simplified. The soil surface is characterized by a thick, spongy mat of living and undecayed vegetation (reduction by bacteria is very slow because of low temperatures), often saturated with water and dotted with ponds.[14] The soil depth is relatively shallow due in part to the underlying permafrost. Because of these and other limiting factors, there is a low rate of nutrient turnover and energy flow. Ecosystems like the Taiga, containing species of plants with low growth rates and animals with low reproduction rates, are generally fragile.[15]

- Northern Coastal Coniferous Forest. Due to favorable climatic conditions, the Northwest Coastal Forest is highly productive in terms of the biomass of the biotic community, particularly in the "standing crop" of producers. Unlike the drier sub-biomes, the precipitation/evaporation ratio is extremely favorable, and the understory vegetation is well developed wherever any light filters through. Trees in conjunction with the abundant lower levels of vegetation combine to provide a thick layer of organic litter (weighing as much as 1,500 pounds per acre) to be broken down by bacteria and other decomposers. The numbers of biotic species and respective populations for the trophic levels, i.e., producers, consumers and decomposers, are relatively high, resulting in a complex but productive ecosystem. Natural succession of plant life is rapid following surface disturbance.

- Montane Coniferous Forest. The Montane has a fairly high annual production rate despite the low temperatures that prevail over most of it during half of the year. The soil contains a fair population of small organisms but comparatively few larger ones. Consequently, the rate of litter decay is slower in the Montane than in the Northwest Coastal Forest and, in conjunction with other factors, is less productive in terms of biomass. The higher elevational zones, supporting alpine trees and meadows, have a short growing season and, because of soil and related conditions, are fragile in nature. Generally, the lack of moisture during the growing season represents the major limitation in the nutrient-energy-water components of the ecosystem.

C. Physiography and Geology

A physiographic classification is based on those geologic processes acting on different rock types and rock structures which erode at different rates to form regions separated by recognizable boundaries.[16] The Coniferous Forest Biome of the western United States and Alaska lies within four major physiographic divisions: (1) the Interior Plains, (2) the Rocky Mountains System, (3) the Intermontane Plateaus, and (4) the Pacific Mountain System. These major divisions are further subdivided into provinces. The Coniferous Forest Biome of the western United States and Alaska covers portions of these provinces: (Figures II-2 and II-3).

Major Division	Province
Interior Plains	Great Plains Province
	Arctic Coastal Plain Province
Rocky Mountain System	Southern Rocky Mountains
	Middle Rocky Mountains
	Northern Rocky Mountains
	Arctic Mountains Province
Intermontane Plateaus	Columbia Plateaus
	Colorado Plateaus
	Northern Plateaus
	Western Alaska Province
Pacific Mountain System	Pacific Border Province
	Cascade Sierra Mountains
	Alaska-Aleutian Province
	Coastal Trough
	Pacific Border Ranges

Since these divisions and provinces may extend into several subbiomes, the first portion of this section will describe the physiography and geology of the Coniferous Forest Biome that covers the Continental western United States; and the second part will describe the Coniferous Forest Biome covering Alaskan physiographic provinces.

FIGURE II-2

PHYSICAL DIVISIONS OF THE UNITED STATES

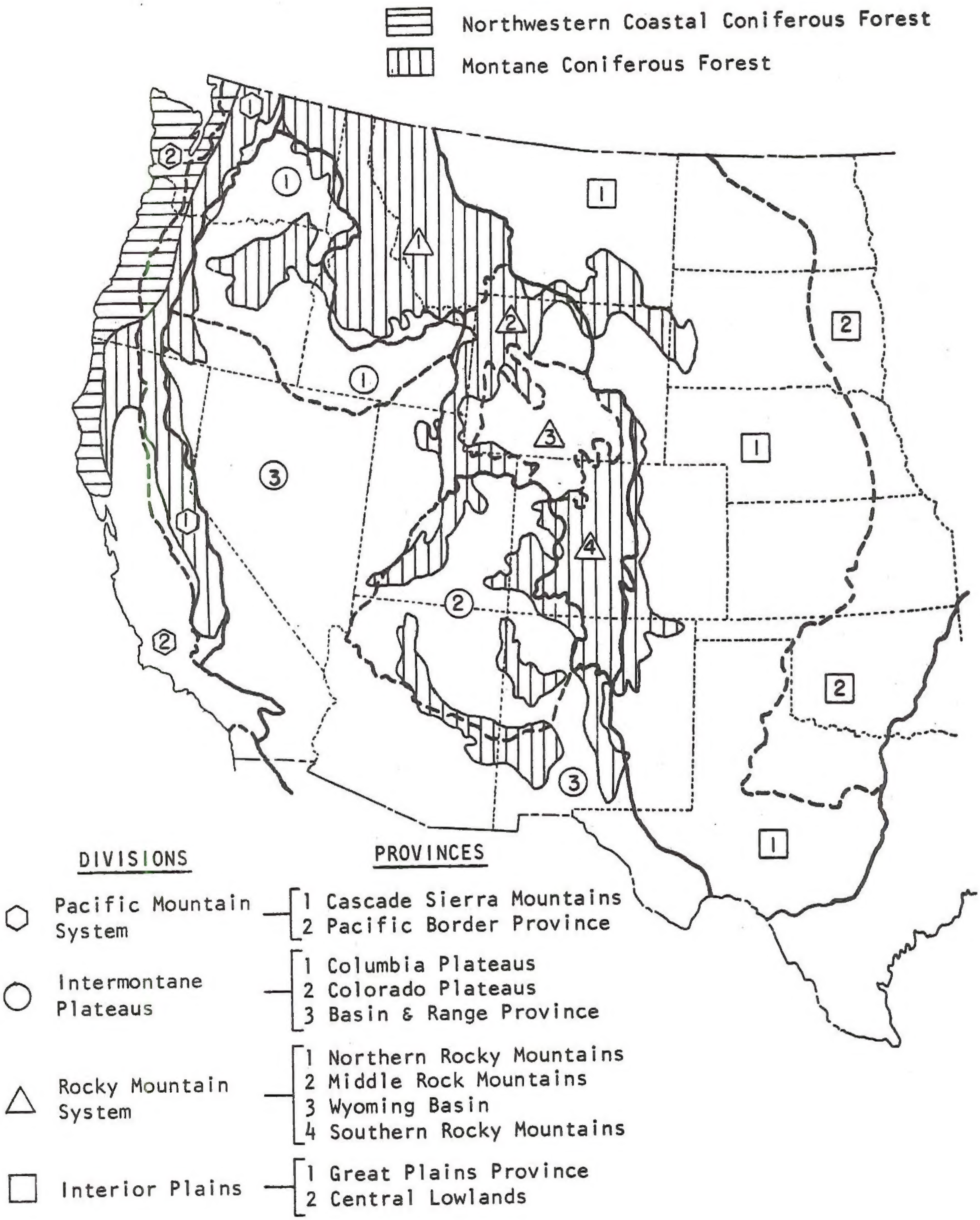
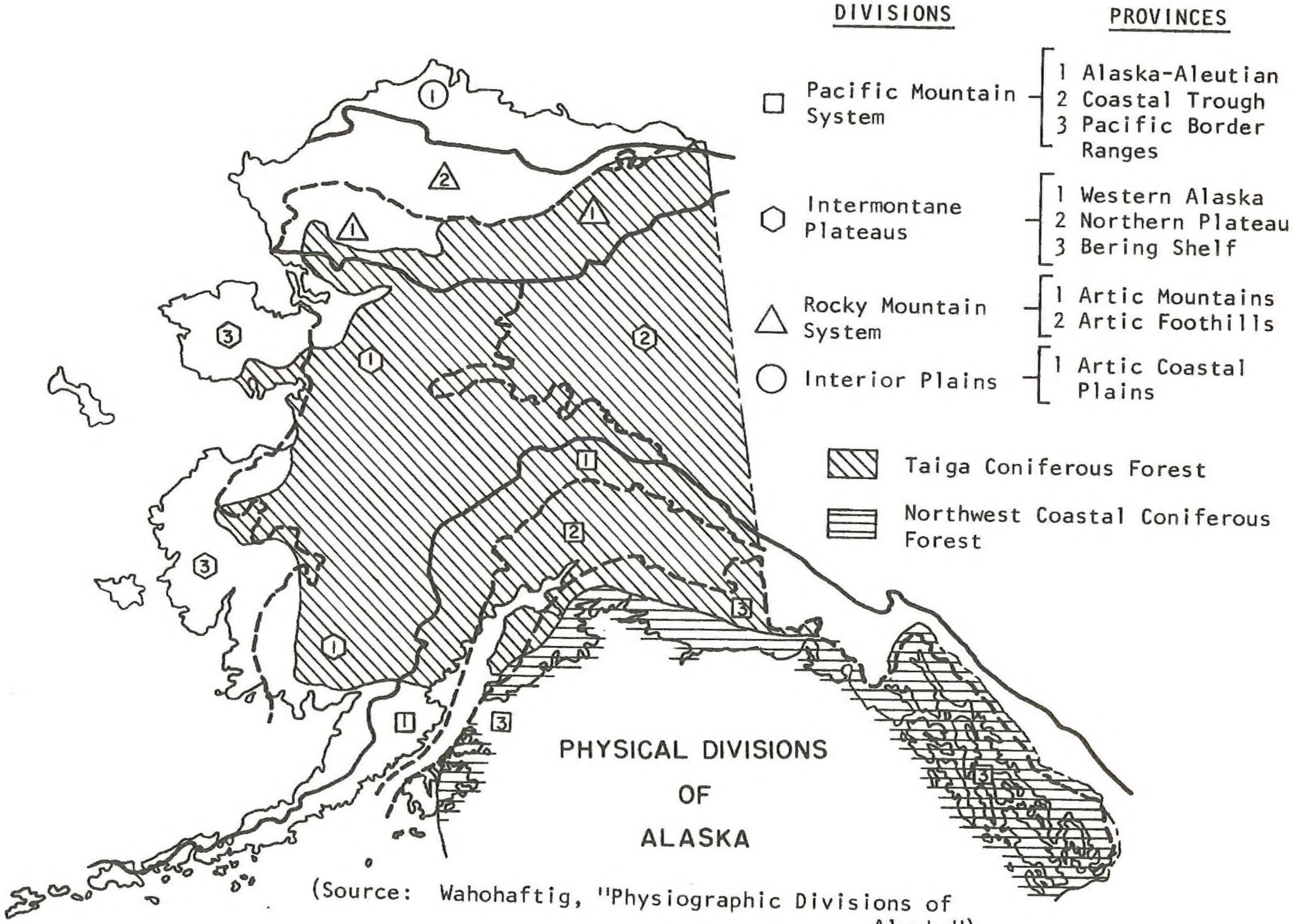


FIGURE II-3



PHYSICAL DIVISIONS OF ALASKA

(Source: Wahohaftig, "Physiographic Divisions of Alaska")

1. Montane and Northwest Coastal Coniferous Forest (Excluding Alaska)

a. Interior Plains

(1) Great Plains Province - Physiography. Eastern portions of the Montane Coniferous Forest lie in the Great Plains Province. The western boundary at the foot of the mountains averages 5500 ft. with a range of 1000 ft. above and below that altitude. The eastern boundary lies between the 1500 and 2000 ft. contour. This indicates a fall in slope to the east of about 10 ft. to the mile. Erosion is more extensive along the margins, generally increasing towards the north. It is into this western portion along the Colorado Piedmont and Missouri Plateau that the Montane Coniferous Forest ex-tends. The topography ranges from rolling hills in the southwest part, grading into mountains and glaciated terrain towards the northwest portions.

(2) Great Plains Province - Geology. The Great Plains Province lies within the central Stable Region, an area where major tectonic activity has been absent over much of geologic time. Rock types consist of a foundation of Pre-Cambrian crystalline rock, which is a continuation of the Canadian Shield, covered by a veneer of sedimentary rock. These sediments vary greatly in thickness from place to place; and several broad basins, arches and domes are present.[17]

b. Rocky Mountain System

(1) Southern, Northern and Middle Rocky Mountain Provinces - Physiography. Much of the Montane Coniferous Forest covers the Rocky Mountain System. This great barrier of mountains lies between the Interior Plains system on the east and the Intermontane Plateaus on the west.

The Northern Rocky Mountain Province differs from the Middle and Southern Rocky Mountain Provinces in landform appearance. The Northern Province lacks the orographic units, i.e., the mountainous topography which are easily distinguished in the Middle and Southern Provinces. The ranges in the Middle and Southern Provinces are linear features with the main crest on structural uplifts flanked by outward-dipping strata making hogback foothills. In the Northern Province most of the larger mountain masses are not linear and don't have an axial crest or monoclinal foothills. They are more like extensive plateaus deeply carved by erosion.

Relief in the Northern Province ranges from 2000 to 5000 feet from the valley floors and mountain crests.

Relief in the Middle Rocky Mountain Province varies from 500 feet in some of the narrow erosion valleys to greater than 3000 feet at the summits of some of the lofty peaks.

Within the Southern Rocky Mountain Province, relief ranges between 3000 and 5000 feet. This Southern Province has 46 mountains in Colorado which rise above 14,000 feet, and 300 more to 13,000 feet. Most rise from 500 to 2500 feet above the surrounding level.[18]

(2) Southern Rocky Mountain Province - Geology. The Southern Rocky Mountain Province consists of broad, elevated, north-south strips of granitic-type rocks generally flanked by steeply dipping sedimentaries. The sediments often make foothills and locally cap the mountains. In the southern part of the Province some of the mountains are made up of volcanic ejecta. Structurally these belts are large anticlines that have been deeply eroded.

(3) Middle Rocky Mountain Province - Geology. The Middle Province is separated from the Southern Province by the Wyoming basin. Rock types are similar to those found in the Southern Province. Most of the mountains have a granitic core flanked by sediments such as the Teton Range, which is a tilted fault block system. The Absoraka Range was formed by the accumulation of volcanics, mostly breccias. Much of the Yellowstone area is covered by lavas. Many of the mountains found within this Middle Province have been altered by glaciers.

(4) Northern Rocky Mountain Province - Geology. This Province is characterized by discordant, nonlinear mountain crests, mainly composed of igneous or metamorphic rocks, which are broken by occasional wide valleys with nearly flat or hilly floors filled with tertiary sediments. Within Idaho a great granitic batholith covering some twenty thousand square miles is exposed.

c. Intermontane Plateaus System

(1) Colorado Plateau Province - Physiography. The Colorado Plateau covers an area of approximately 130,000 square miles, characterized by badlands, high escarpments, deep gorges, and many strongly differentiated smaller plateaus.

The rocks exhibit a distinguishable pattern of horizontal bedding, dissected into hundreds of canyons, the largest of which is the Grand Canyon. Except for some of the canyon bottoms the plateau elevations lie between 5,000 and 11,000 feet, some of the plateaus being higher than the surrounding mountains. This Province generally overlooks its neighbors from a bold escarpment except to the north and east where it is bordered by high mountains.

(2) Colorado Plateau Province - Geology. The rock types making up the plateau are mostly thick bedded, horizontally layered, sedimentary rocks of Cretaceous to Tertiary Age. Another significant type of structure in the Colorado Plateau Province is the laccolithic intrusion; a lens-shaped intrusive body that has domed up the overlying sedimentary beds.[19] Several such intrusions have produced mountains on/the plateau. The volcanic field is another important geologic feature that can be found on the Colorado Plateau,along the east, west and southern borders.

(3) Columbia Plateau Province - Physiography. The Columbia Plateau Province covers about 100,000 square miles in Washington, Oregon and Idaho. The topography consists of flat, rolling hills, horizontally layered lava flows, all of which are broken by many variations such as the Blue Mountains, incised valleys, dissected plateaus and broad alluvial terraces. The Columbia and Snake Rivers have cut deep gorges in many places.

(4) Columbia Plateaus - Geology. Lava flows make up most of the rocks in this Province, occurring in horizontally layered flows from 10 to 200 feet thick. The Snake River cuts through more than 4000 feet of basalts along the western boundary of Idaho. Granitic rocks underlie the basalts in southwestern Idaho, being part of the Great Idaho batholith. Continental lake bed sediments occur in southeastern Oregon and southwestern Idaho. During the Pleistocene much of western Washington was altered by the effects of glaciation, leaving an area called "The Channeled Scablands" covered with Pleistocene and recent sediments.

(5) Basin and Range Province - Physiography. The Basin and Range Province is characterized by mostly elongate, northerly trending, blocky mountains separated by desert basin. It extends from southern Oregon on into Mexico, covering about 300,000 square miles. Altitudes vary from below sea level in Death Valley to more than 12,000 feet, but relief is generally no more than 5,000 feet.

(6) Basin and Range Province - Geology. Thick sediments, mostly sandstone, siltstone and shales derived from volcanic rocks, fill the basins. Block faulting of the rocks has resulted in the formation of the upthrusted mountains and downdropped basins.

The Basin and Range Province has little commercial timber and, therefore, will not be emphasized throughout the environmental statement.

d. Pacific Mountains System

(1) Cascade Sierra Mountains Province and Pacific Border Province - Physiography. The Northwest Coastal Coniferous Forest boundary lies within the Pacific Border Physiographic Province. This province is characterized by a chain of mountains called the "Coast Ranges" including the Olympics, Oregon Coast Ranges, Klamath and the California Ranges. East of the mountains is a line of valleys including the Cowlitz, upper Chehalis, and Puget Sound Valleys in Washington, and the Willamette Valley of Oregon, which is cut off in northern California and southern Oregon by the Klamath Mountains Complex. Generally, the northern part of the Pacific Border Province is expressed by peaks with similar elevations (accordant crests) and local alpine peaks; the central part by an uplifted peneplain (an eroded surface which has been uplifted by folding, faulting or intrusion) and the southern part by parallel ranges with rounded crests of subequal height.

The Cascade-Sierra Mountains Province, which forms the eastern margin of the Pacific Mountain System, constitutes a single province but differs in character between the north and south. The Montane Coniferous Forest boundary runs along the crest of the Cascade Range down to southwestern Oregon, then southwesterly and south along the crest of the Coast Ranges.

It forms a single mountain barrier between the plateaus on the east and the valleys on the west. The length of the mountain ranges is more than 1000 miles with an average width of 50 to 60 miles. Crest height varies but not over short distances. In the southern Sierras it ranges from 12,000 to 14,000 feet with Mt Whitney rising to 14,497 feet. The lowest average height is in the southern Cascade Mountains in northern California and southern Oregon. The province is narrowest at this place with high, isolated mountains and no continuous crests. From Mt. Whitney to northern California there is a gradual but not uniform decline in altitude. A 6000 to 8000 foot crest level is common farther north.

(2) Pacific Border Province - Geology. The geology of this province is diverse in character, varying from lowland troughs to broken coastal ranges.

The northern portion of this province is a partly submerged drainage system. Some of this area has been glaciated and is covered with glacial deposits overlying non-resistant geosynclinal sediments (a geosyncline is an elongated trough that will eventually form folded mountains). The coast ranges on this northern part are the result of an uplifted peneplain intruded by volcanics and partially carved by glaciers. Moving south, this uplifted peneplain composed of weaker Tertiary rocks has been dissected and is characterized monadnocks (a mountain-like mass such as a butte) of igneous rock rising above the adjacent topography. Farther south the mountains are composed of more complex, metamorphosed rocks uplifted and dissected with longitudinal drainage patterns. The California Coastal Ranges are the southernmost range of mountains covered by the Northwest Coastal Coniferous Forest. Their general trend is northwesterly with elevations ranging between 2000 and 4000 feet. The ranges and valleys are roughly parallel with rounded crests and have been folded and faulted. Most of the rocks are metamorphosed, including indurated sandstones, slate, and other resistant rocks.[20] Weaker sedimentary rocks occupy the structural troughs. Volcanic rocks are relatively absent from the area. Granite underlies much of the range.

The San Andreas Fault can be traced for 530 miles southeastward from Point Arenas at about latitude 39 degrees.

(3) Cascade-Sierra Mountains - Geology. The Cascade Mountains geology is in contrast to that of the Sierra Mountains Complex.

The Cascade can be divided into the Northern Cascades and the Middle and Southern Cascades.

The Northern Cascades are covered with ancient sediments vastly older than the present topography, strongly folded and in part metamorphosed and intruded by granitic batholiths. Some granitic peaks such at Mt. Stuart occur irregularly as monadnocks. Glaciers have altered the topographic expression of many of the peaks.

Igneous-rock types in the Middle and Southern Cascades are mostly siliceous andesites. These congeal quickly after eruption to form a mountainous topography unlike the plateau basalts to the east, which congealed slowly and flowed out to form plateau type landforms. Local accumulations of siliceous andesites were aided by eruption of fragmental products, bombs, lapilli, dust, and cinders and are in sufficient quantity to help determine topography.

The Sierra Nevada is a massive and continuous range extending from latitude 34 degrees 50' to latitude 40 degrees 20', a distance of about 400 miles. The massif is a tilted fault block with a steep east-facing fault scarp. It has been submaturely dissected by deep valleys, and the northern part has been glaciated. Three-fourths of the rocks are granitic in origin. North of latitude 37 degrees 20', about one-third of the rocks are sediments which have been metamorphosed and in part schistose. These beds have been closely folded. Further north, tertiary volcanics including lavas and tuffs were extruded near the crest of the range and flowed west in shallow valleys, displacing the streams. These rocks are in smaller proportions than those rocks making up the southern extent of the range.

2. Taiga and Northwest Coastal Coniferous Forests (Alaska)

a. Interior Plains

(1) Arctic Coastal Plain Province - Physiography. The Interior Plains System is the northern most physiographic division in Alaska. The Taiga covers the northeastern part of the Arctic Central Plain Province. The plain is smooth, rising to a maximum altitude of 600 feet at its southern margin. Drainage is poor and during the summer the surface is marshy. There are no glaciers, but the entire area is underlain by permafrost at least 1000 feet thick. The base of the summer thaw zone is between 1/2 to 4 feet below the surface.

b. Rocky Mountain System

(1) Arctic Mountains Province - Physiography

This province is characterized by mountains, hills and lowlands, the highest peaks rising to elevations of 7000 - 8000 feet in the Brooks Range. Drainage patterns are diverse flowing north and south down the mountain slopes with the predominant drainage of the Brooks Range flowing south into the lowland areas. Glaciers have carved the rocks in the Brooks Range. Evidence of glaciation is expressed in sharp peaks and crested divides, cirques and a few tarns or glacial lakes. Small cirque glaciers are still present at the higher elevations in the central and eastern part of the range. Towards the west, glaciers have carved the sedimentary rocks into cliff and bench slopes. The mountains to the west have rounded to sharp summits lower in elevation than the mountains to the east.

(2) Arctic Mountains Province - Geology. Most of the rocks making up the province are folded and over-thrust Paleozoic and Mesozoic sedimentary rocks, including limestone and shales and metamorphics including quartzites, slates and schists. Granite intrusions occur in the southwest part of the Brooks Range.

c. Intermontane Plateaus System

Most of the Taiga Coniferous Forest of Alaska covers this physiographic division. This system has been divided into the Northern Plateaus Province and the Western Alaska Province.

(1) Northern Plateaus Province, Western Alaska Province - Physiography. This province consists of uplands and lowlands carved by glaciers. The topography ranges from low ridges having gentle slopes, narrow valleys of low country consisting of low-rounded ridges and open valleys, basins, marshy lake dotted flats, and highland areas consisting of even-topped rounded ridges rising 2000 - 4000 feet in altitude to isolated areas of more rugged mountains, some as high as 5500 feet. Moraine-dammed lakes can be found in some of the glaciated mountain passes; thaw lakes and oxbow lakes cover some of the lowland areas along the Yukon River. Much of this province is drained by tributaries of the Yukon River. Permafrost covers most of the province; but where discontinuous permafrost occurs, periglacial mass-wasting develops at higher altitudes, and frozen muck covers the valley bottoms during the summer months.

(2) Northern Plateaus Provinces - Geology. Crystalline schist, granite, quartzite, slate, and mafic igneous rocks, probably mostly Paleozoic in age, overlie deformed Paleozoic and Mesozoic sedimentary rocks in the northeastern corner of the province. Some of the mountains in the southeastern part are moderately folded and faulted sedimentary and volcanic rocks. Cliff-forming rocks including formations of limestone, dolomite, quartzite and greenstones are also found in this area, along with continental sandstones and conglomerate of late Cretaceous and early Tertiary Age. Farther west the basins are mantled with outwash gravel, silt and morainal deposits over Pre-Cambrian schists and Mesozoic granitic instrusions.

(3) Western Alaska Province - Geology. Folded and fault-ed Cretaceous sedimentary rocks cover most of this province. Some of the gently rolling hills in the northwest corner are underlain by Palezoic and Mesozoic metamorphosed volcanics and granitic intrusives. Lava flows mantled with river flood plain deposits and windborne silt cover the lowlands towards the west.

d. Pacific Mountain System

(1) Alaska-Aleutian Province, Coastal Trough and Pacific Border Ranges - Physiography. Three provinces make up the Pacific Mountian System. The Taiga Coniferous Forest boundary extends into the Alaska-Aleutian Province and the Coastal Trough Province. The Northwest Coastal Coniferous Forest is spread over the Pacific Border Ranges.

Many, parrallel, rugged, glaciated north and northeast trending ridges 7000 - 12,000 feet in altitude, and dotted with large lakes that occupy glaciated valleys, make up the southwestern Alaska Ranges. Glaciated peaks, varying in height between 6000 and 9000 feet, cover the central and eastern portions of the Alaska-Aleutian Province. Braided glacial streams follow the trend of the glaciated valleys and major river drainages.

The Coastal Trough Province is a continuous belt of lowlands with uplifts of oval mountains breaking up the topographic expression. Glacial features, including drumlins, eskers, outwash plains, and moraines, are easily discernible in the lowlands. The mountains also show evidence of glaciation as is expressed by their rugged peaks and U-shaped valleys.

The Pacific Border Range Provinces which are covered by the Northwest Coastal Coniferous Forest include a rugged barrier of mountains varying in altitude from 3000 feet in the western part to spectacular, isolated, blocklike mountains rising up to 19,000 feet in elevation. The central Gulf of Alaska has a more diversified topography marked by longitudinal beach and sand dune ridges, crossed by outwash plains and morainal topography.

(2) Aleutian Range - Geology. Granitic batholiths intrude into moderately metamorphosed and highly deformed Paleozoic and Mesozoic volcanic and sedimentary rocks in the southern Alaska Ranges. Structurally the rocks trend in a northerly direction.

The central and eastern Alaska Range is a complex synclinorium (a belt of folded inward dipping rocks) having Cretaceous rocks in the center and Paleozoic and Pre-Cambrian rocks on the flanks.[21] Granitic stocks and batholiths support some of the high mountains.

(3) Coastal Trough - Geology. Glacial moraine and outwash overlies poorly consolidated coal-bearing rocks of Tertiary Age. The isolated mountains within the lowlands generally consist of metamorphic and granitic rocks of Mesozoic Age.

(4) Pacific Border Province - Geology. The higher mountain masses are composed of sedimentary and metamorphic rock, Mesozoic in age, underlain by crystalline schist and granitic intrusives. Volcanic and sedimentary rocks extend along the north side of the St. Elias Mountains. The general trend of the mountain masses is east-west.

D. Minerals.[22-24]

The Coniferous Forest Biome of the western United States and Alaska, which includes the Northwest Coastal Coniferous Forest and the Montane Coniferous Forest, has a diverse accumulation of locatable, leaseable and saleable minerals distributed within its boundaries. Although at a first glance it appears that these minerals are randomly dispersed, closer examination of economic minerals maps and geologic maps showing rock types, tectonics, and geophysical anomalies, indicates that there is some continuity in the occurrence of these minerals. Oil, gas, coal and geothermal steam are included as minerals.

1. Montane Coniferous Forest and Northwest Coastal Coniferous Forest (Excluding Alaska)

Locatable mineral deposits are probably more pronounced in these sub-biomes than in any of the others. The deposits are principally of the vein type and are closely associated with the Laramide orogeny of the Rocky Mountains, the Sierra batholith and the Idaho batholith within the Montane Coniferous Forest and the Pacific Coast disturbances within the Northwest Coastal Coniferous Forest. The deposits are distributed throughout the sub-biomes except that few, if any, are found in Montane Coniferous Forests in east-central Arizona and west-central New Mexico, Wyoming and southeast Montana.

Locatable minerals that occur most commonly include gold, silver, copper, lead, zinc, iron, manganese, chromium, cobalt, nickel, molybdenum, vanadium, tungsten, niobium, tantalum, tin, fluorspar, barite, gypsum, magnesite, brucite, uranium and bentonite (it is undetermined whether bentonite is locatable or leasable at this time).

Leaseable minerals are coal, oil, gas, oil shale, bituminous sands, sodium (trona) and evaporite bedded deposits found along the flanks of the mountain ranges, including potash, borates, sulfur and phosphate. Eastern Idaho and western Montana have extensive phosphate beds. Coal of all types, varying from anthracites through bituminous and lignites can be found with the principal concentrations occurring in the Rocky Mountain and western Interior Plains physiographic systems. Few if any leasable mineral deposits are found in these portions of the biome in northeastern Washington, northeastern Oregon, Idaho, northwestern Montana, and central Arizona although further exploration may yield minerals within these areas. Much of the lands have been classified as potentially valuable for geothermal steam and associated geothermal resources. (Fig. II-4 and II-5)

Salable minerals including sand, stone, gravel, pumice, pumicite, cinders, clay, other mineral materials and petrified wood are ubiquitous throughout the biome.

2. Taiga Coniferous Forest and Northwest Coastal Coniferous Forest (Alaska)

Locatable minerals are found throughout the Taiga and Northwest Coastal Coniferous Forest areas (Fig. II-6). The prominent minerals included fluorspar, barite, gypsum, zinc, gold, silver, copper, lead, tin, and platinum. The gypsum which is found in the northwest coastal area is of the evaporite type. Most of the minerals are found in close association with the fault systems throughout the area, and are primarily of the fissure filling or vein replacement type. Some of the deposits, in particular tin, gold, silver and platinum, are found as placer deposits along rivers. Barite occurs in bedded cretaceous sediments in the northwest coastal area.

FIGURE II-4

MAP OF THE WESTERN UNITED STATES SHOWING LANDS CLASSIFIED FOR GEOTHERMAL

(Source: USGS Circular 647)

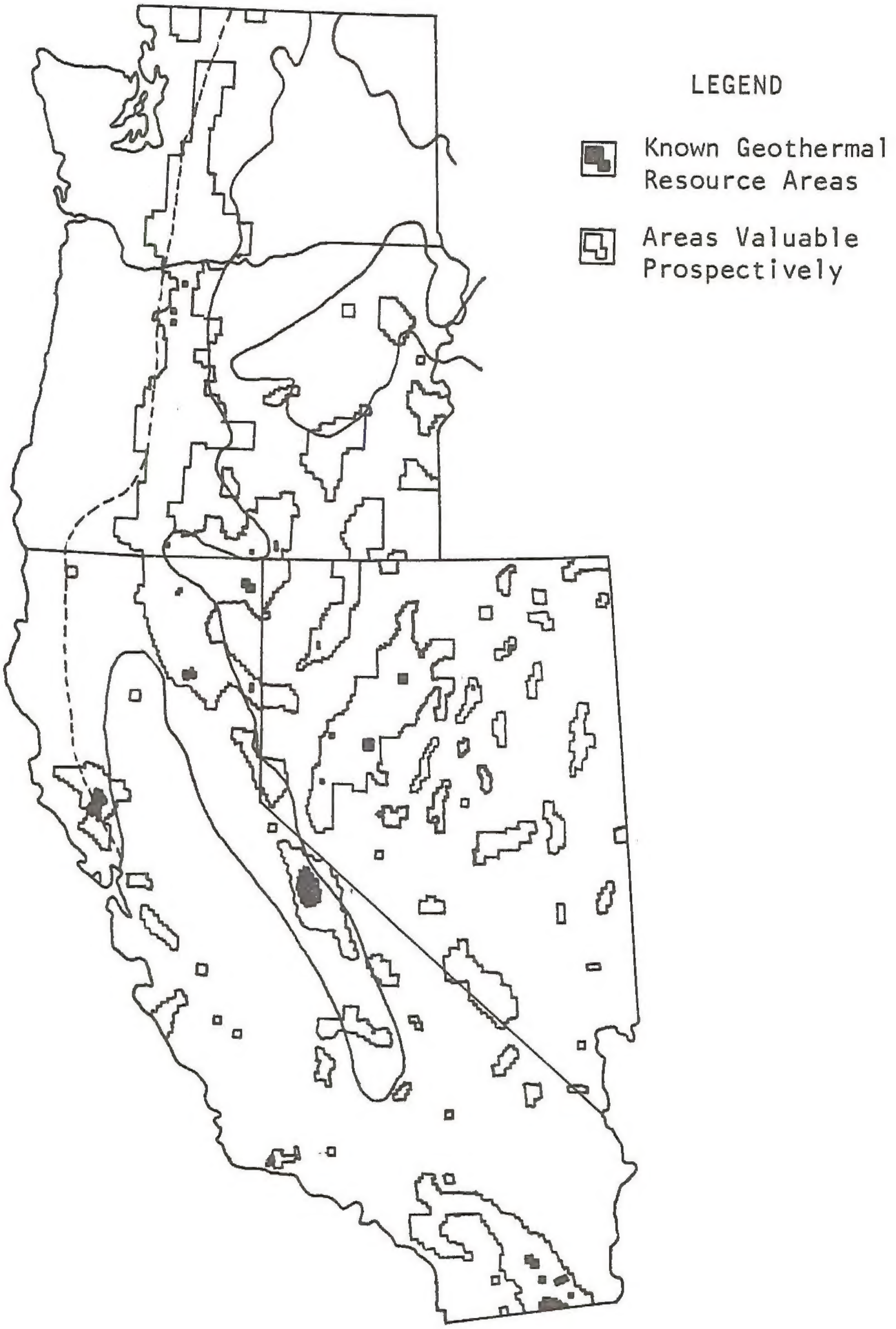


FIGURE II-5

MAP OF THE WESTERN UNITED STATES SHOWING LANDS CLASSIFIED FOR GEOTHERMAL

(Source: USGS Circular 647)

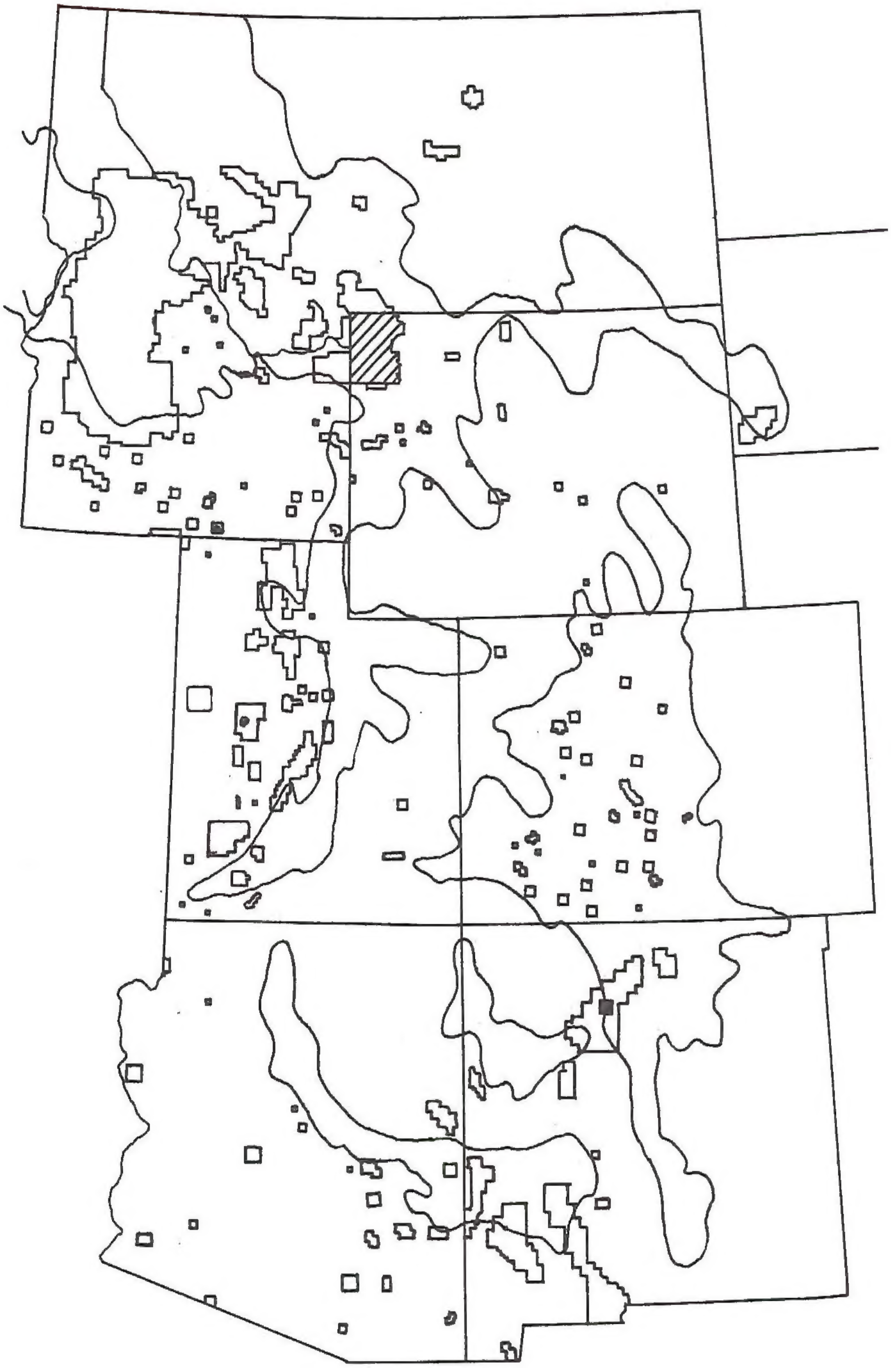
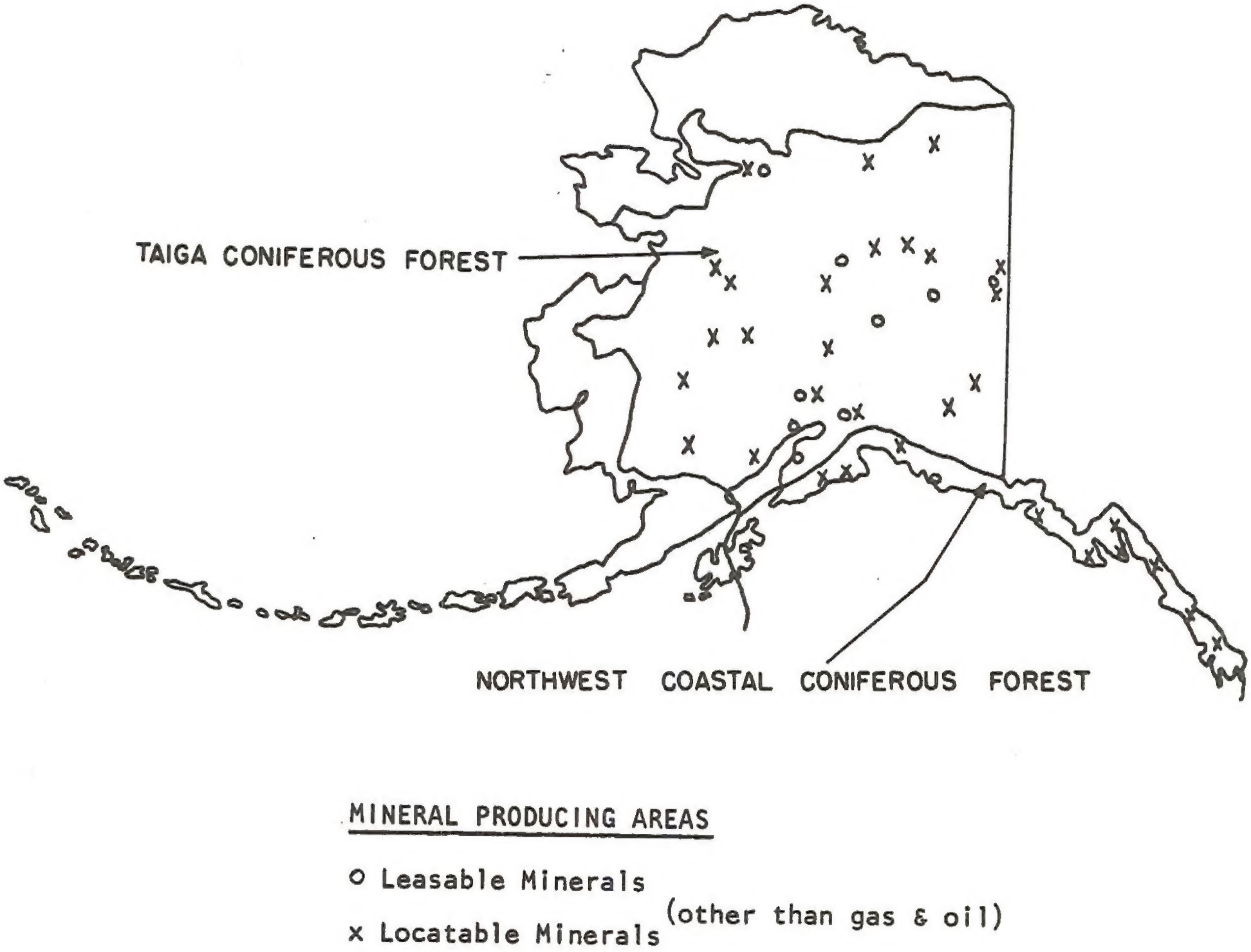


FIGURE II-6

CONIFEROUS FOREST BIOME

(Source: 1970 National Atlas)



The leasable minerals in these same areas include coal, geothermal resources and oil and gas (Fig. II-7).

E. Soils

The soils in the Coniferous Forest Biome are extremely varied in depth, texture, and stoniness. They occur on topography that ranges from nearly level to very steep and range from poorly drained to well drained. These soils will be discussed at an order level, which is quite broad, and is based on weathering characteristics. These orders are shown on Figure II-8. They are defined as follows:

- Alfisols - Soils medium to high in bases with gray to brown surface horizons and subsurface horizons of clay accumulation. The soils are usually moist but, during the warm season of the year, some are dry part of the time.
- Aridisols - Soils that have pedogenic horizons and are low in organic matter and never moist as long as three consecutive months.
- Entisols - Soils that have no pedogenic horizons.
- Inceptisols - Soils that have weakly differentiated horizons, materials in the soil that have been altered or removed but have not accumulated. These soils are usually moist but, during the warm season of the year, some are dry part of the time.
- Mollisols - Soils that have nearly black, friable organic-rich surface horizons high in bases, formed mostly in subhumid and semiarid warm to cold climates.
- Ultisols - Soils that are low in bases and have subsurface horizons of clay accumulation. These soils are usually moist but, during the warm season of the year, some are dry part of the time.

Generally, the Northwest Coastal's major soil orders are Ultisols and Inceptisols; the Taiga's major order is Inceptisols; and the Montane's major orders are Mollisols and Alfisols. In the parts that follow, the soil orders found in the Coniferous Forest Biome will be discussed first and followed, where applicable, by the individual sub-biomes.

1. Northwest Coastal, Taiga and Montane Coniferous Forests

Inceptisols and Ultisols generally occur in the higher elevations and in areas receiving larger amounts of precipitation. Ultisols have clay enriched subsoils, are acid in nature and may have light or dark colored surfaces. Characteristics of the Inceptisols vary greatly. The soils in these two orders occur in northeastern California, western Oregon and Washington, adjacent to the Canadian border in northern Idaho and northwestern Montana, and south in the Rocky Mountains to central Idaho. Inceptisols are found throughout Alaska where mineral soils occur.

MAP OF ALASKA SHOWING LANDS CLASSIFIED FOR GEOTHERMAL RESOURCES EFFECTIVE DECEMBER 24, 1970

(Source: USGS Circular 647)

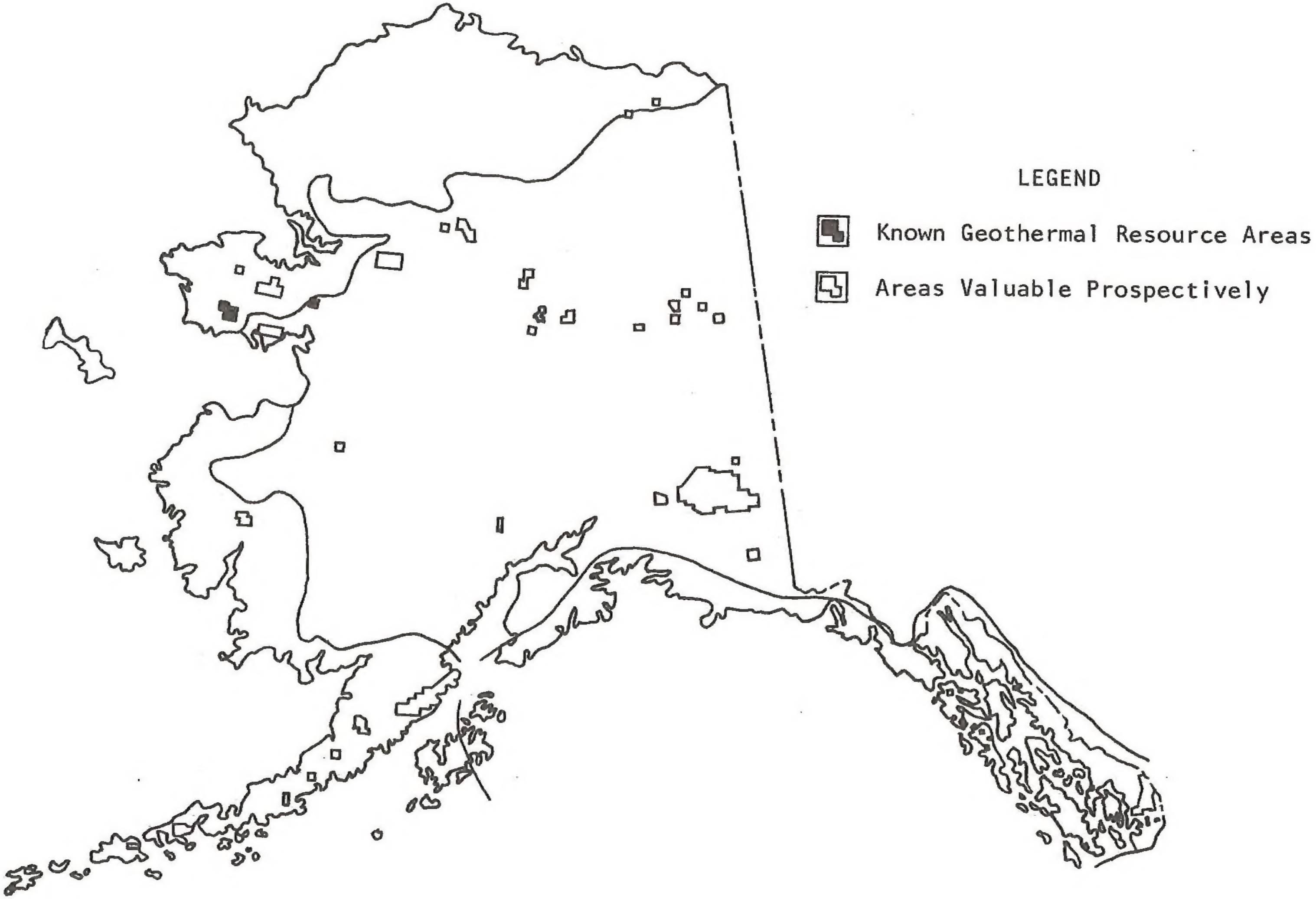

LEGEND
▨ Known Geothermal Resource Areas
☐ Areas Valuable Prospectively

FIGURE II-7

U. S. DEPARTMENT OF AGRICULTURE

GENERAL SOIL MAP OF THE UNITED STATES

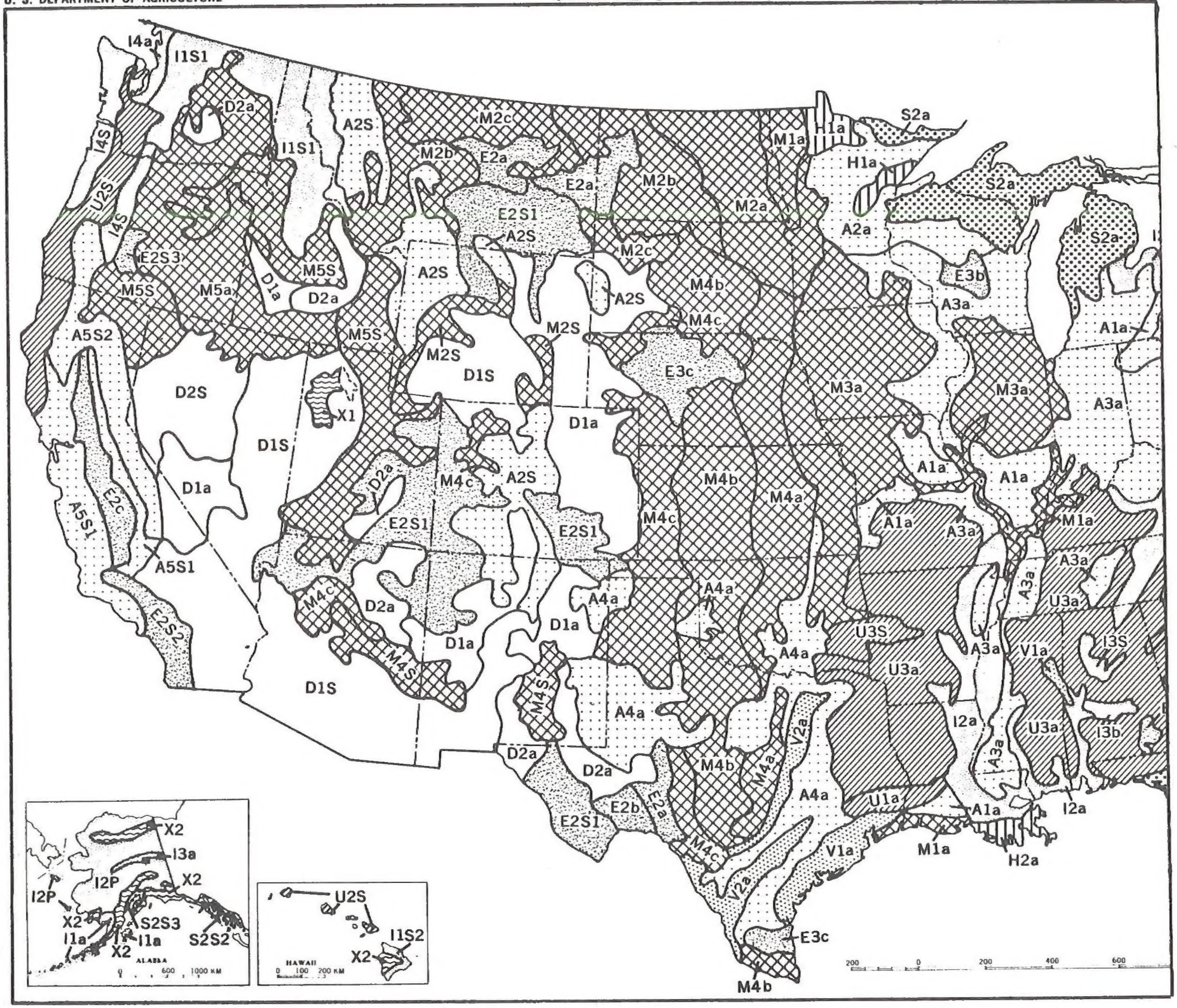


FIGURE II-8

(legend on following page)

Legend
(General Soil Map of the United States)

Alfisols - Symbols starting with A
Aridisols - Symbols starting with D
Entisols - Symbols starting with E
Inceptisols - Symbols starting with I
Mollisols - Symbols starting with M
Ultisols - Symbols starting with U
Areas with little soil - Symbols starting with X

Inceptisols and Ultisols which are less than 20 inches deep and contain over 35% coarse fragments are very difficult to reforest to the desired level of stocking in the desired length of time. Productivity on these soils is low. Landslide hazard is high after disturbance where the shallow stony Inceptisols are derived from sedimentary bedrock and occur on slopes greater than 80 percent. This is especially true when they are influenced by groundwater, such as in draws. Ultisols usually reflect relatively stable conditions. However, landslide hazard is high after road construction if these soils are underlain by weathered bedrock.

Productivity and regeneration success of commercial tree species are high on the deep, non-stony Inceptisols and Ultisols. Compaction hazard is high on Ultisols. Productivity is about one-half a site class lower on dry Ultisols and Inceptisols than it is on moist ones. Productivity is also lower on the frigid soils than on the wet soils.

2. Taiga Coniferous Forest

Permafrost conditions occur discontinuously through portions of the Taiga Forests of interior Alaska. The soils of the river valleys and the lower side slopes of the mountains are covered with a thin to thick blanket of vegetative material that acts as an insulating mat. In most of interior Alaska, this mat provides protection and stabilizes the underlying soils which are frozen or a permafrost soil. When the vegetative cover is disturbed or removed, the permafrost is exposed and, during the short but warm summer period, the exposed permafrost melts at exceedingly high rates.

3. Montane Coniferous Forest

Alfisols occur in areas receiving less rainfall than the Inceptisols and Ultisols. Therefore, the base status is higher. Alfisols have a clay enriched subsoil and a gray to brown surface soil. The large areas of Alfisols are located on the east and west side of the Sacramento Valley in California and areas on the east front of the Rocky Mountains in Montana, Wyoming, and Colorado. Alfisols commonly occur in dry zones. These soils usually have a high hazard for compaction. Reforestation is very difficult on Alfisols, and on Inceptisols and Ultisols when they are less than 20 inches deep, contain over 35% coarse fragments and occur in a xeric zone. Productivity is also low in these situations. Alfisols are relatively stable unless they are underlain by decomposed or unconsolidated bedrock.

Mollisols have a high base status, have a surface enriched in organic matter and have dark colored surfaces. Mollisols are located in the southern Rocky Mountains in Utah and Arizona. Mollisols occur under dry and moist conditions as well as warm and cold conditions. Productivity decreases as Mollisols become dry and also when they become cold. Mollisols less than 20 inches deep, occurring in the dry zone and containing over 35% coarse fragments, have severe reforestation problems.

Entisols are young soils lacking diagnostic horizons. They occur in areas having recent deposits of alluvium, on very steep, raveling slopes and on recently stabilized sand dunes. These soils occur in western Colorado, northwestern New Mexico and central Utah. Entisols on steep, raveling slopes are unstable and have a high hazard for landslides and erosion. Most Entisols that occur on the floodplains have a high hazard for flooding.

Aridisols are generally associated with the desert, as they have prolonged dry periods. However, there are small areas of Aridisols supporting coniferous forests in New Mexico and Arizona. Moisture is a limiting factor on these soils.

F. Water [25-27]

The water resources of the Coniferous Forest Biome provide most of the water needs for the western United States. In the subregions of the Columbia-North Pacific, northern California, Great Basin and the Upper and Lower Colorado, over 90% of the runoff originates in high elevation forests. The major rivers and streams which originate in forested regions also contribute to recharge of the ground water aquifers underlying adjacent biomes (grassland, desert, woodland-bushland). The generally higher elevation coniferous forests vary widely in annual precipitation received, ranging from 5 inches in the extreme northern part of the Taiga Forest in Alaska to more than 200 inches at some stations along the coastal areas of southeastern Alaska and northwestern Washington. Many of the coniferous forests are water surplus areas because of the large amounts of precipitation, and these forests provide generous quantities of high quality water which in some areas exceeds the demand.

1. Surface Water

The large quantities of water found in the Coniferous Forest Biome occur as streams, rivers, lakes, reservoirs, springs, marshes, muskeg, and pot holes. These water resources are extremely important for many uses including power generation, industrial, municipal, agricultural, recreation and fish and wildlife (Photo II-1). One measure of the importance of this resource is given by the large number of inter-national, interstate, intrastate, and interagency agreements on the disposition of water for various uses.

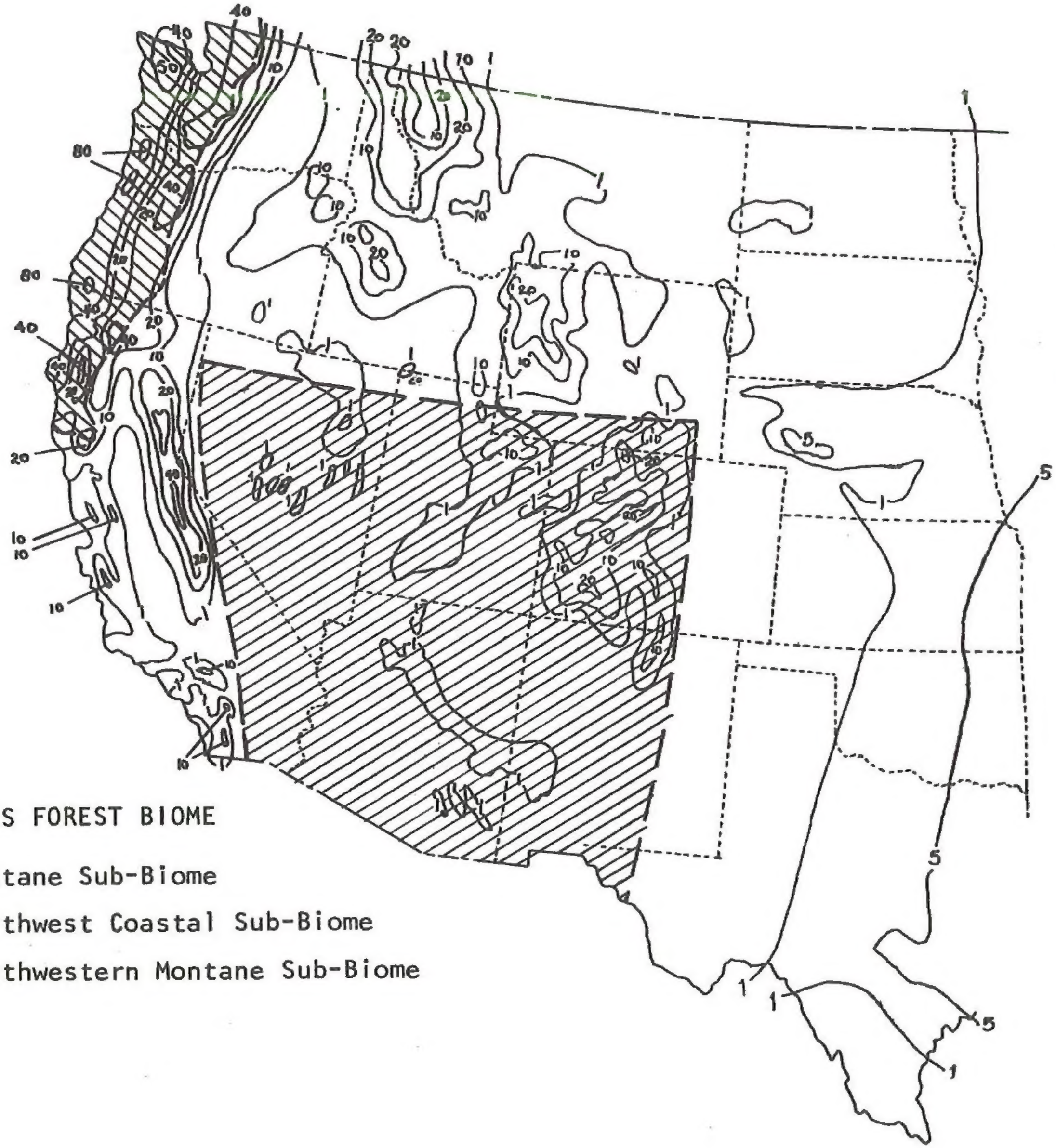
PHOTO II-1: Surface water resources of the Coniferous Forest Biome. These water resources are important for many uses including power generation, industrial, municipal, agricultural, recreation and fish and wildlife.

Water yield from coniferous forests shows extreme regional variation, ranging from about 1 inch per year in the southwestern Montane (Fig. II-9) to over 200 inches at some locations in the Northwest Coastal on the southeastern Alaska coast. Along the lower elevation coastal areas of the Northwest Coastal in the northern California, Oregon and Washington, where much of the precipitation occurs as winter rainfall, most of the runoff comes during the period of November through March. The runoff from mountainous areas adjacent to the Gulf of Alaska shows little seasonal variation since streamflow is derived from both rainfall and snowmelt.

The Taiga in the interior of Alaska has low runoff rates and progressively shorter, summer runoff seasons with increasing latitude. In these areas, 80% to 95% of the annual runoff occurs during the 5-month period from May to September. In the Taiga, permafrost restricts subsurface drainage, creates extensive areas of wetlands and muskeg, and restricts groundwater recharge. As a result, many streams have little or no winter-flow. Severe annual floods, complicated by ice jams, are characteristic throughout this region. Large areas are inundated each year by overbank flow, which requires evacuation of villages along the rivers. Ice scouring contributes to heavy debris and sediment loads during the spring breakup.

Many parts of the northern Montane region produce surpluses of good quality water (Fig. II-10). Most of the runoff appears in response to snowmelt and spring rains. This region has a low runoff period from late summer through late spring. Much of the region has a water deficiency of from 0 to 20 inches, where the demands on water exceed the supply by this amount. Stream-flow from the southwestern Montane region depends heavily upon snowmelt contributions from the high elevation coniferous forests. For example, in the upper Colorado River basin 75% of the streamflow originates as snowmelt from 33% of the area of this region which is in coniferous forest or above timberline.

Research is currently underway in the upper timber zone of the Sierras relative to the augmentation of water supplies through vegetative manipulation. Harvesting timber in patterns which encourage greater snow-pack accumulation has resulted in an increased water yield of over 4 inches in operational programs. Forest management for augmentation of runoff is also found in the southwestern Montane forests of the Colorado Rockies.



AVERAGE ANNUAL RUNOFF
FOR THE
WESTERN UNITED STATES

(Source: Linsley, Kohler, & Paulhus, "Applied Hydrology", Fig. 9-25)

FIGURE II-9

CONIFEROUS FOREST BIOME

□ Montane Sub-Biome
▧ Northwest Coastal Sub-Biome
▨ Southwestern Montane Sub-Biome

AREAS OF NATURAL WATER SURPLUS AND NATURAL WATER DEFICIENCY

(Source: The Nation's Water Resources)

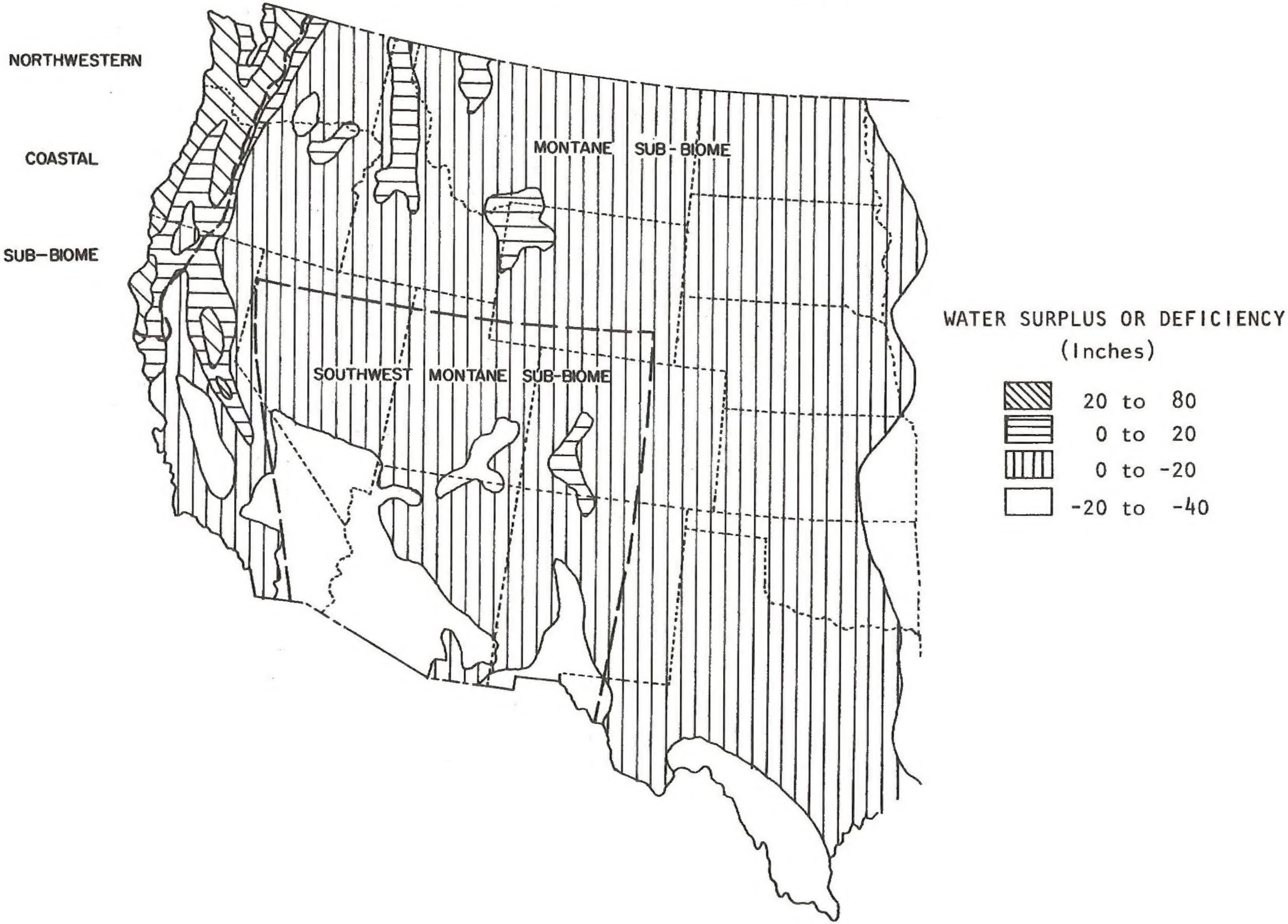


FIGURE II-10

Water quality is generally good throughout the Taiga except for two specific situations, (1) sediment contribution of glacier-fed streams is high, and (2) waters derived from extensive muskeg and swamp areas are unusually high in organic compounds and iron content because of the restricted subsurface drainage. The quality of most surface waters in the Northwest Coastal in Oregon and Washington is generally good, with concentration of dissolved solids less than 120 ppm (Fig. II-11). Similar low concentrations may be found in the northern Montane along the Cascades, the Sierras, and in northern Montana. Concentration of dissolved solids is much higher in streamflow from the southwestern Montane. This decrease in water quality is caused by lower annual precipitation, greater evaporation and geologic material which is more easily soluble in water.

Sediment concentration is generally low in streamflow in the Taiga, the coastal areas and much of the northern Montane region (Fig. II-12). Exceptions are glacial streams in Alaska (as already noted) and around Mt. Rainier in Washington. Streamflow in the southwestern Montane is more likely to have higher sediment concentrations because of the higher incidence of summer thunderstorms and because much of the geologic material is relatively erodible. An exception to this is the area around the Colorado Rockies which is composed of relatively hard rock.

Total nitrogen content of streams draining coniferous forest lands averages about 0.5 parts per million. By contrast, a stream draining agricultural lands may contain twice this concentration of nitrogen.

The dissolved oxygen content of water depends upon temperature, turbulence of flow (which entraps atmospheric oxygen) and the amount of organic material in the water which requires oxidation. The capacity of water to hold dissolved oxygen decreases as water temperature increases, as the turbulence of stream flow decreases (because of reduced entrapment of oxygen) and as the amount of organic material in the stream increases.

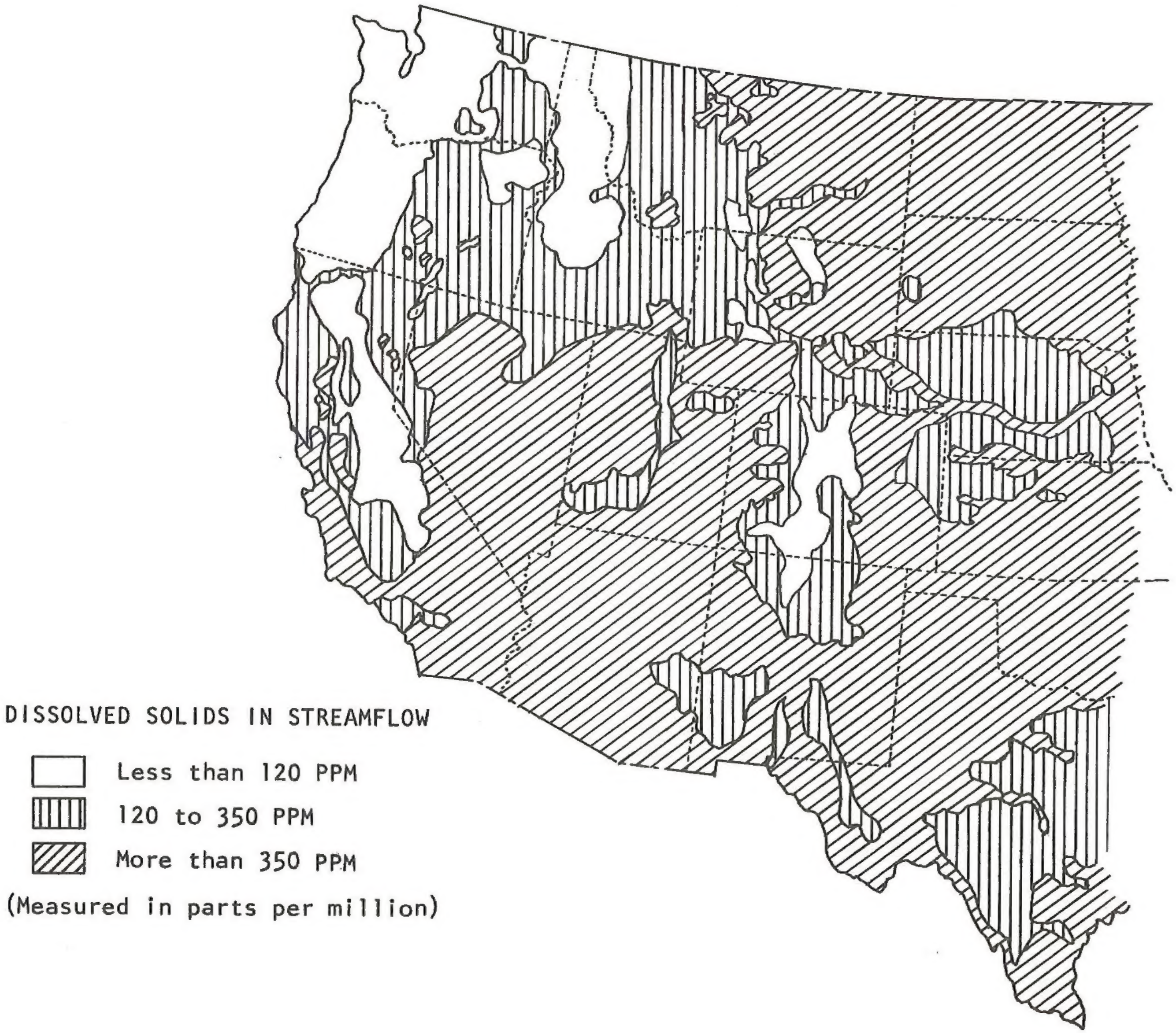
2. Groundwater

Large quantities of groundwater are known to be available throughout most of the Yukon River flood plain in the Taiga region of Alaska. Little use is presently being made of this resource because settlement and industry are almost non-existent. In portions of the region which are underlain by permafrost, groundwater is extremely difficult to obtain. High salinity is a problem in the northern part of the Taiga.

FIGURE II-11

CONCENTRATION OF DISSOLVED SOLIDS IN STREAMFLOW

(Source: The Nation's Water Resources)


DISSOLVED SOLIDS IN STREAMFLOW
☐ Less than 120 PPM
▥ 120 to 350 PPM
▨ More than 350 PPM
(Measured in parts per million)

CONCENTRATION OF SEDIMENT IN STREAMS

(Source: The Nation's Water Resources)

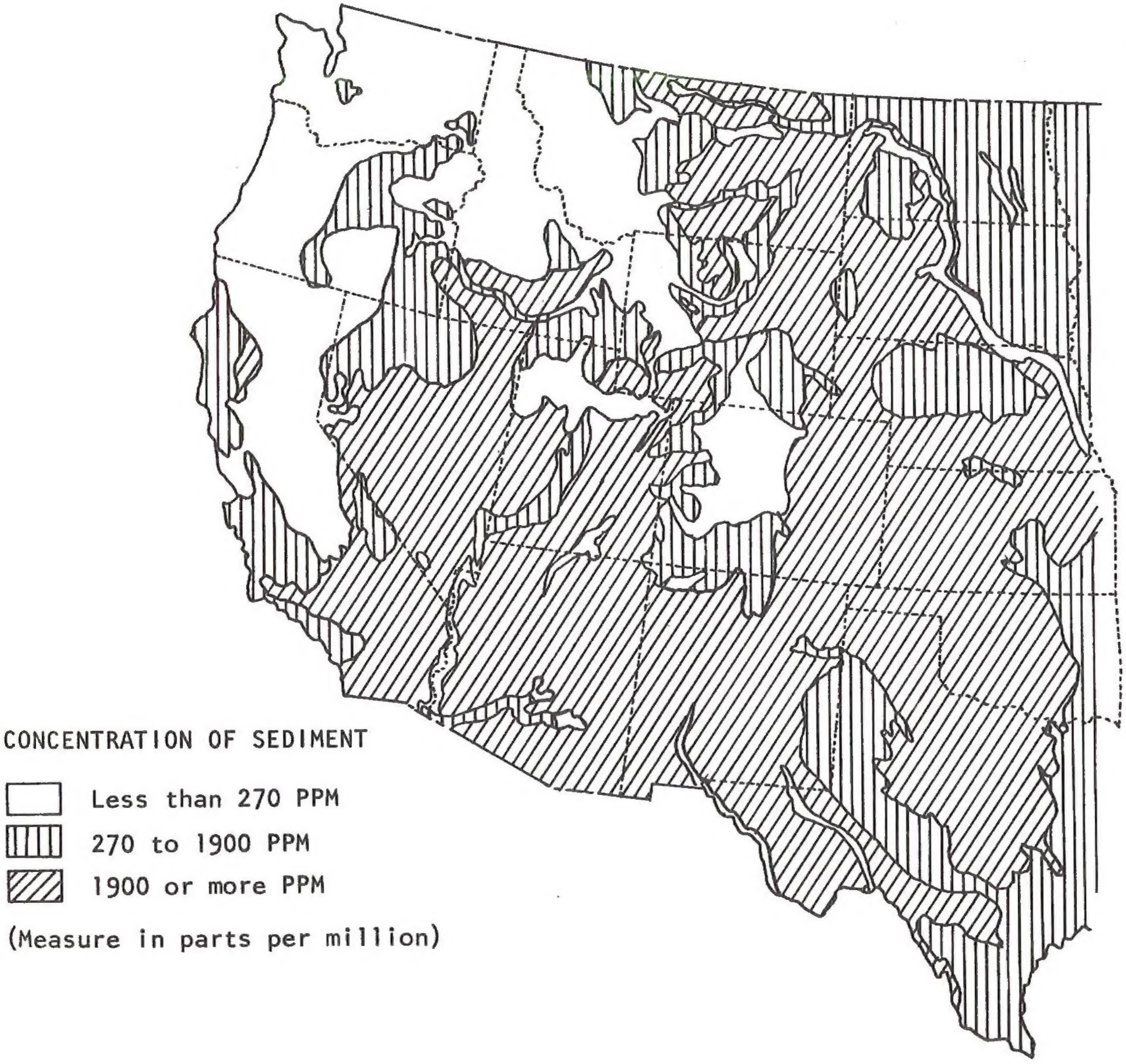


FIGURE II-12

Groundwater is limited in the Northwest Coastal region of Alaska where steep mountains, rapid runoff, and a lack of surficial deposits to store and retain groundwater preclude its use.[27] Groundwater aquifers in the Northwest Coastal region of the continental United States are composed of alluvial valley fills surrounded by forested mountains from which they receive runoff replenishment. One of the largest of these aquifers is within the Willamette Valley-Puget Sound Trough in Oregon and Washington (Figure II-13). The Northwest Coastal region of the continental United States also overlaps another alluvial groundwater aquifer in northern California, where runoff from forested watersheds replaces annual groundwater pumpage. Smaller alluvial aquifers within valleys provide a source of groundwater for municipal and industrial use at many locations in the northern Montane region. An important source of replenishment for these aquifers is infiltration of water from streams which arise in the coniferous forests.

G. Climate and Air

A dense forest, says Zon, is like an enormous umbrella with holes in it, covering the earth.[28] It is to be expected that the elements of climate -- moisture, temperature, light, air movement -- are modified under such a cover. Moreover, the climate adjacent to but not under the umbrella is also somewhat modified. It follows that, even though man can do little or nothing to affect the climate in general, he can influence it to some extent locally by adding or removing forest cover.

Different kinds of forests have different effects, but numerous observations have shown that, in general, the sub-biomes of the Coniferous Forest Biome have certain local climatic effects in common. Some of these effects are as follows:[29]

- The mean maximum monthly air temperature in the forest is about 4° F. lower during the summer than the temperature outside; in winter, it is about 2° F. lower.

- Forest soil is warmer by 2° F. in winter and 5° F. to 9° F. cooler in summer than soil outside the forest. Freezing, if any, is significantly less than outside the forest.

- Sunlight intensity if reduced 50 to 90 percent within the forest, the amount of reduction depending on the density of the forest cover and its species composition (kinds of trees constituting the forest).

- A considerable amount of total precipitation is intercepted by the forest crown and evaporates before it can reach the ground.

- The relative humidity of the air is greater within the forest than outside by 3 to 12 percent. Evaporation from the soil under the forest is reduced, the magnitude being dependent upon the forest canopy.

MAJOR AREAS OF POTENTIAL GROUNDWATER DEVELOPMENT

(Source: The Nation's Water Resources)

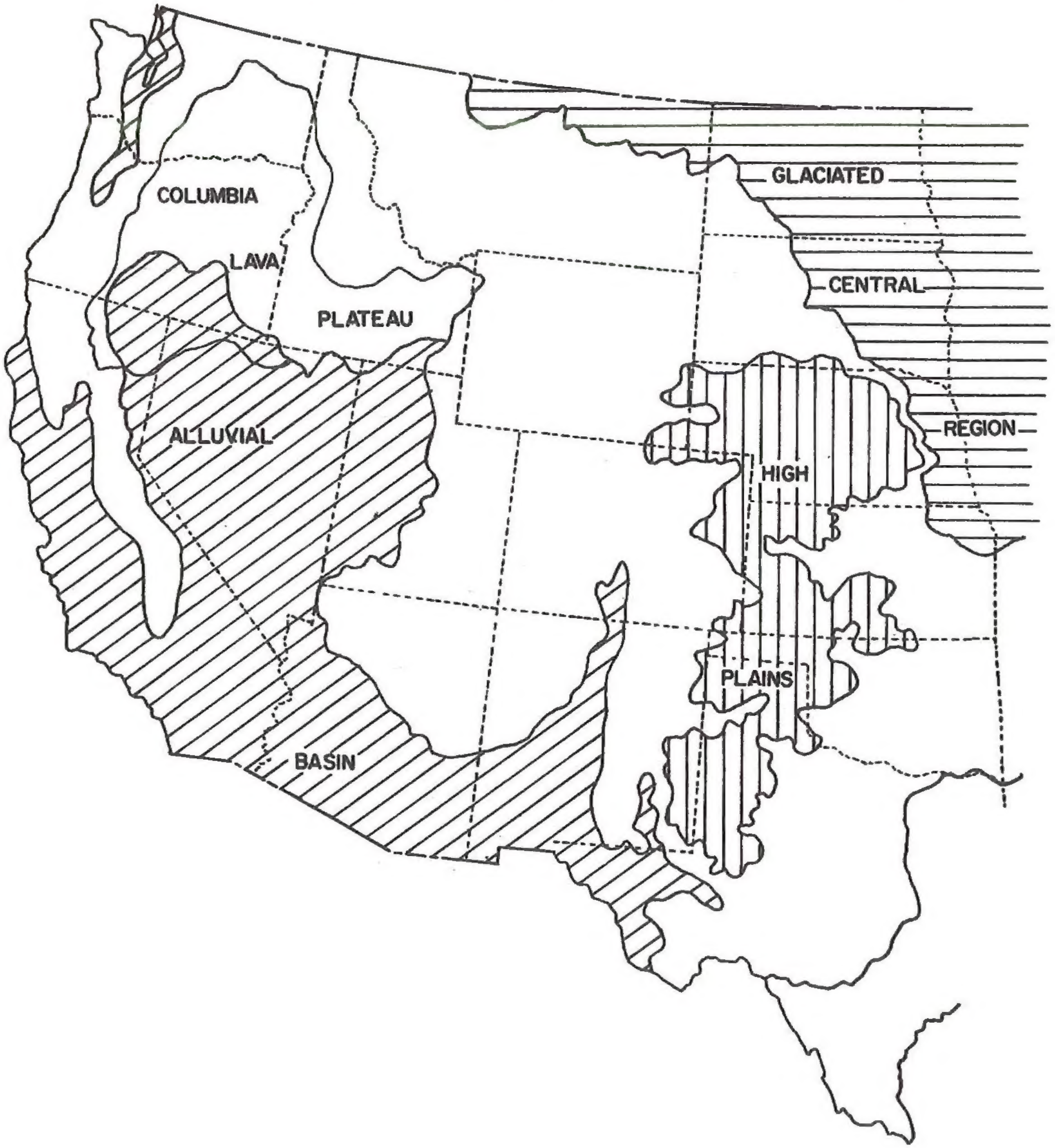


FIGURE II-13

- Air temperature differentials between forests and adjoining open areas cause air movement between forests and fields. These air currents facilitate the formation of dew and fog over adjoining fields.

- Wind velocities are immensely reduced within the forest.

Forests affect climate, but climate affects forests to a far greater extent. Climate and soils are the two major factors which have determined the location and character of the great forest zones of the world. [30]

The geographical occurrence of the Coniferous Forest Biome, and its species composition, are influenced to a large extent by moist air masses moving easterly from the mild temperatures of the Pacific Ocean's Japan Current; [31] by polar air masses originating over the Arctic Ocean, interior Alaska and northwestern Canada; and by extensive moun-tain ranges that modify marine air from the Pacific, act as barriers to incursions of polar or tropical air, and support, on their slopes, climatic conditions which vary with changes in elevation, latitude, soil, exposure and land form.

Significant climatic differences within the biome require seperate discussion, as follows:

1. Northwest Coastal Coniferous Forest

This sub-biome is characterized by heavy rainfall during late autumn, winter and spring. Moist winds from the Pacific Ocean have given rise to the forests of this region.[32] July and August are generally the driest months; December and January, the wettest [33] (Figures II-15, II-16, and II-17). Average annual precipitation ranges from 20-25 inches in the San Francisco area [34] and 60-140 inches on the Olympic Peninsula of Washington, to 60-160 inches on the southern and southeastern coast of Alaska [35] (Figure II-14). More than two-thirds of this annual precipitation falls during the period from October 1 to March 31.

Low temperatures range from - 25° F. on the southern coast of Alaska to 25° F. at Oakland, California;[36] high temperatures can exceed 90° F. throughout the sub-biome.[37] Mean monthly temperatures range from 25° F. (Alaska coast) and 45° F. (California coast) in midwinter, to 55° F. (Alaska coast) and 65° F. (California coast) during July.[38] The length of growing season (period between last killing frost in spring and first killing frost in fall) ranges from more than 300 days in the southern latitudes of the sub-biome to as little as 100 days along the Alaska coast.[39]

During the winter months, coastal southwesterly winds sometimes attain hurricane force causing extensive damage to forest stands. Northerly winds prevail in summer. Thunderstroms are infrequent.

AVERAGE ANNUAL PRECIPITATION

(Source: The National Atlas of the U.S.A.)

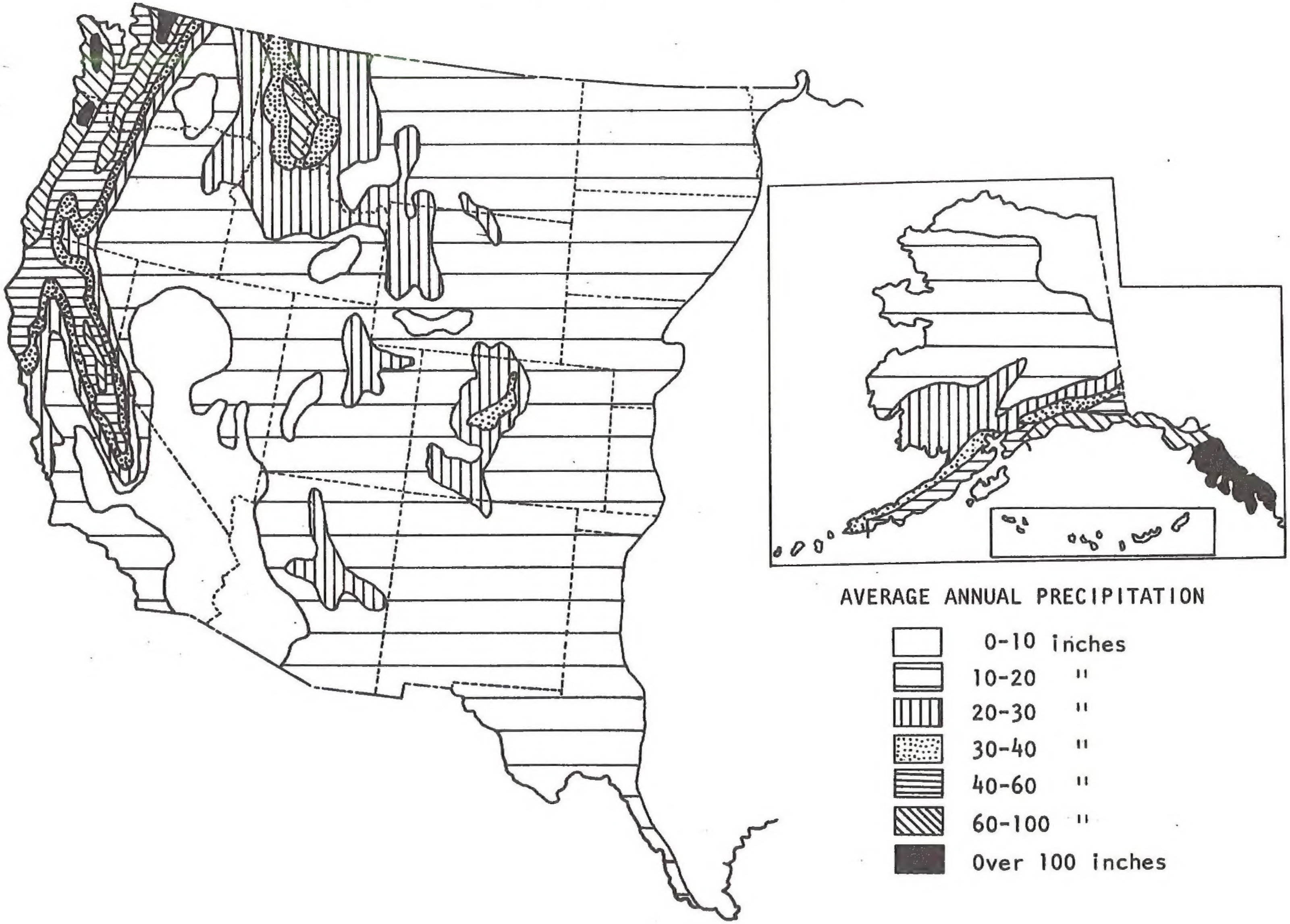


FIGURE II-14

MONTHLY PRECIPITATION (INCHES)-JULY

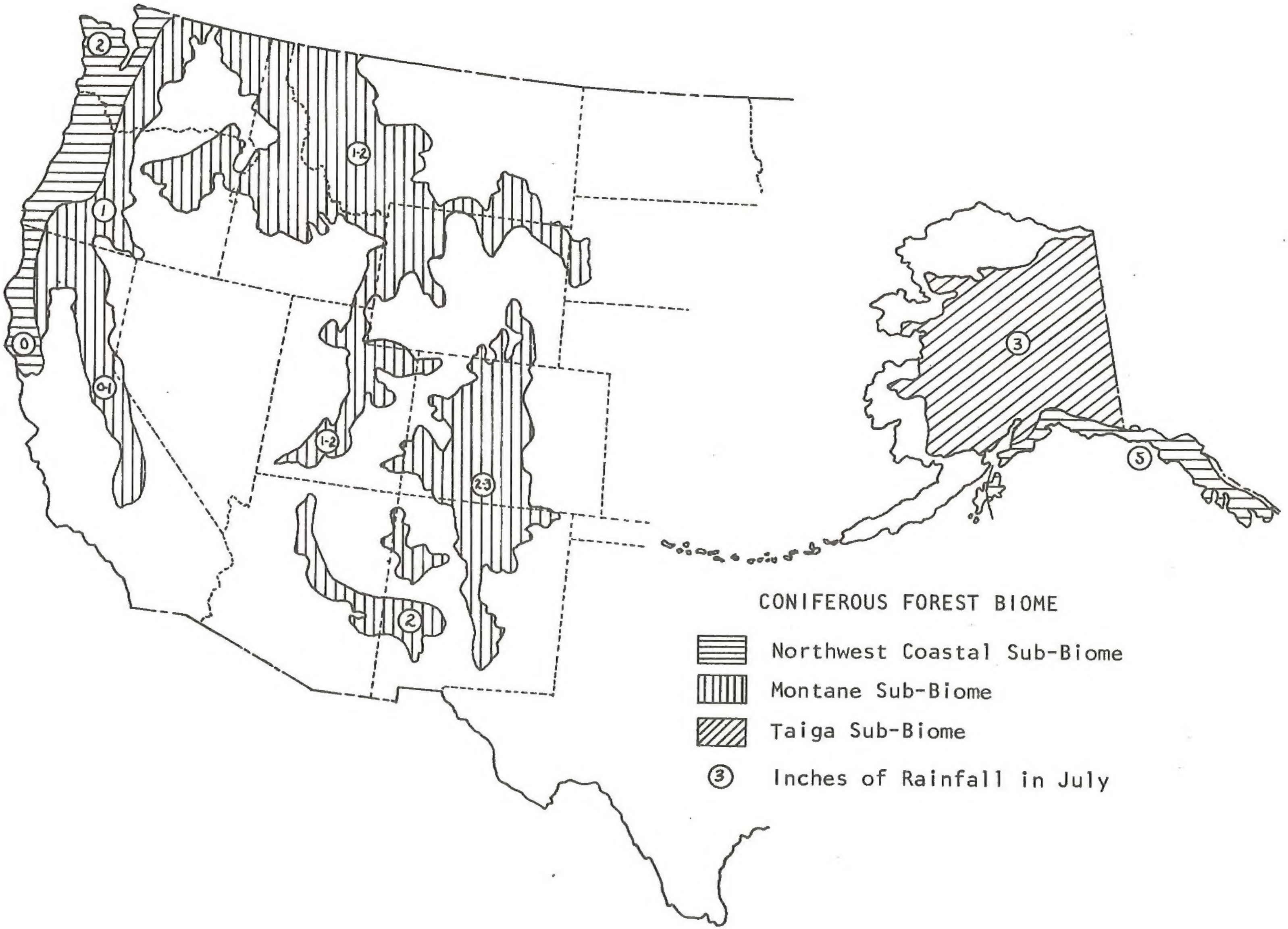
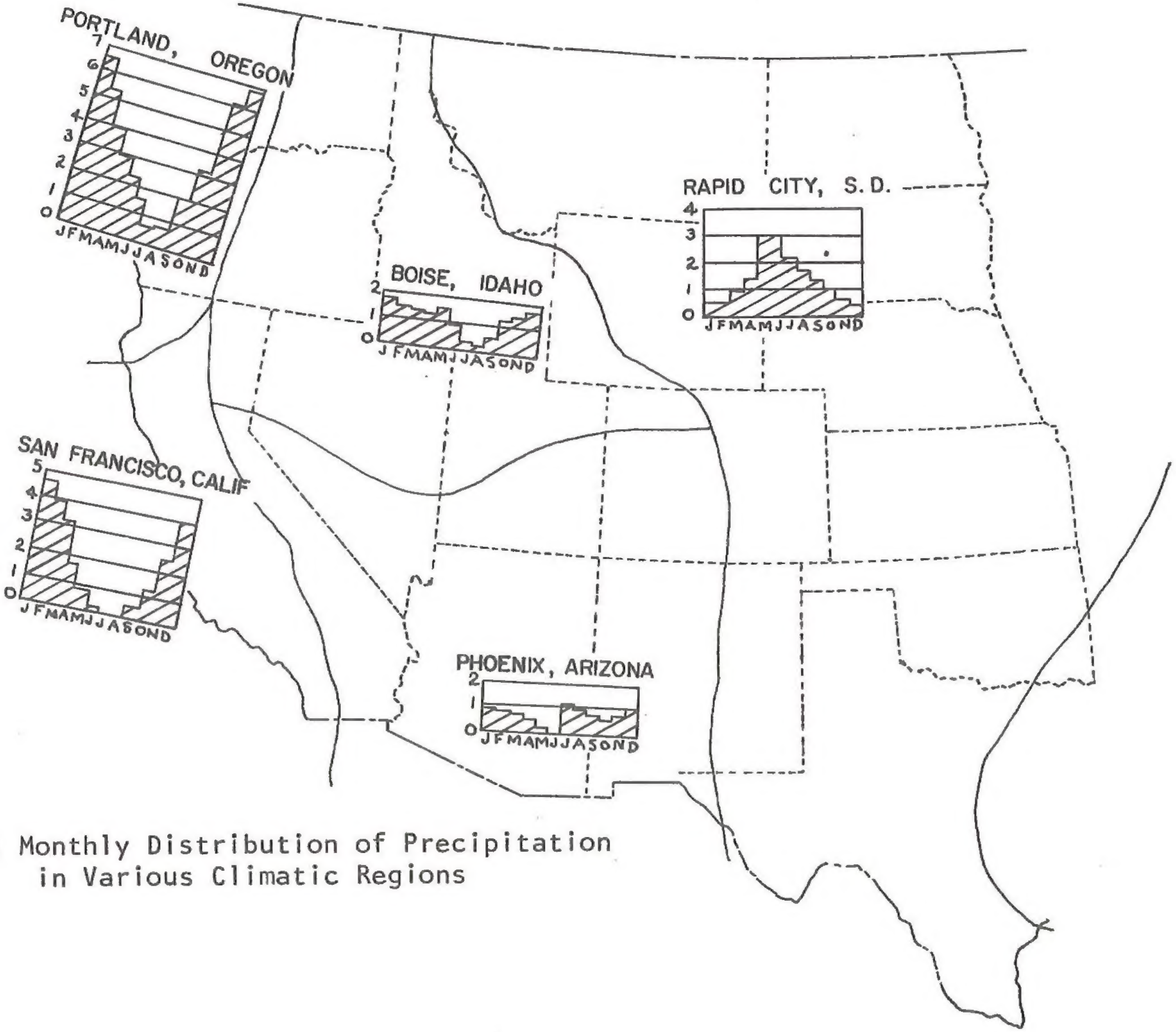


FIGURE II-15

MONTHLY PRECIPITATION

(Source: Linsley, Kohler, & Paulhus, "Applied Hydrology", Fig. 6-22)



Typical Monthly Distribution of Precipitation in Various Climatic Regions

FIGURE II-16

MONTHLY PRECIPITATION (INCHES)-JANUARY

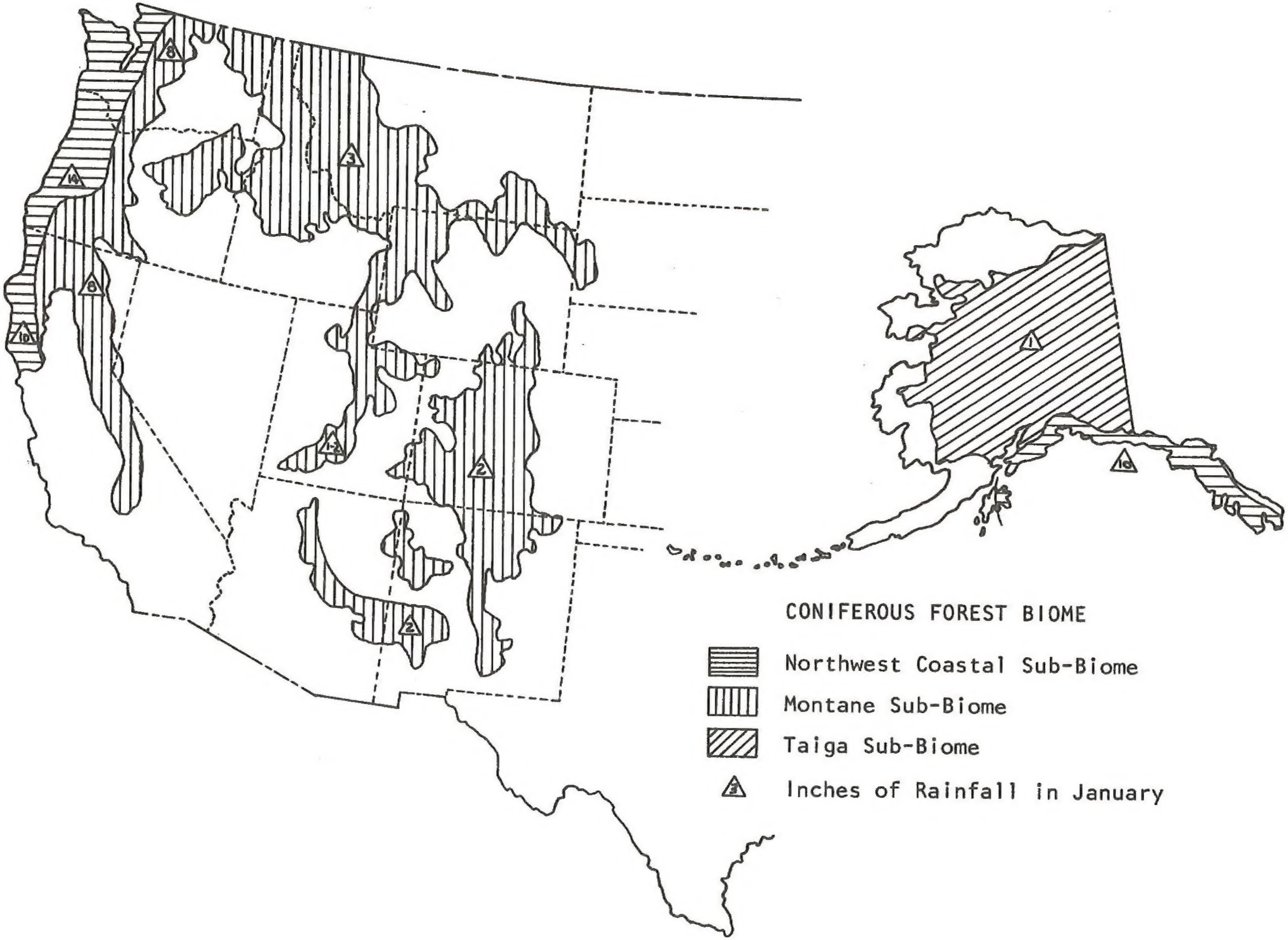


FIGURE II-17

2. Montane Coniferous Forest

In this sub-biome the elevation and latitude are major climatic influences; the higher and more northerly the location, the colder and wetter the climate. There is also a general decrease in precipitation from west to east, which is related to increasing distance from the Pacific Ocean. The oceanic influence is fairly strong on the east slopes of the Cascade Mountains in Washington and Oregon, and in the Sierras of California. The Rocky Mountain area in general has a continental climate. However, the northern part of the intermountain area (that portion of the sub-biome which lies within the Columbia River basin) is strongly affected by the Pacific air masses which penetrate the Cascades via the Columbia River gap, and move eastward and northeastward across the intermountain plateau to the western slopes of the northern Rockies.

Annual precipitation at the lower forested elevations (3000-4000 feet) generally averages about 16 inches a year. At the higher elevations, approximate annual average precipitation in the Sierras of California is 50 inches, in the Cascades of Washington and Oregon 90 inches, and in the Rockies 30 inches (Figure II-14). Average January precipitation varies from 8 inches along the Sierras and Cascades to 1-3 inches in the Rockies. July precipitation averages 1 inch or less in the Sierra and Cascades and 2-3 inches in the Rockies (Figure II-15 and II-16).

Nearly all winter precipitation at the higher elevations occurs as snowfall. Snow depths are periodically measured at fixed locations, as basis for predictions of spring and summer streamflow at lower elevations.

Average temperatures during January range from about 30° F. at the lower elevations and southern latitudes to 10° F. at the higher elevations and northern extremes of the sub-biome. Mean July temperatures vary from 60° F. to 75° F.[26] Maximum length of growing seasons is about 200 days (lower elevations, southern latitudes), minimum length about 60 days.[26]

Wind directions and velocities are influenced by topography. There is considerable convective activity, especially during the summer months. At the summits of the mountain ranges, winds are generally from the west and are frequently very strong in winter and spring.

Thunderstorms are frequent in the northern Rocky Mountain and intermountain plateau areas (40-50 thunderstorms annually), and in the central and southern Rockies (50-70 annually). Usually occurring during the warm, dry months of summer, these storms are accompanied by lightning activity which frequently causes fires in inaccessible forested areas, thus, creating major protection problems.

3. Taiga Coniferous Forest

This sub-biome is characterized by severe winters. Average annual precipitation varies from 7 inches in the upper Yukon Valley (at Fort Yukon) to 12 inches at Fairbanks and 16 inches in the Matanuska Valley although some of the higher elevations receive more than 30 inches (Figure II-14). July and August are the wettest months; January one of the driest [40] (Figure II-17).

Low temperatures range from - 35° F. in the Matanuska Valley to - 78° F. in the Yukon basin (at Fort Yukon). High temperatures of 91° F. in the Matanuska Valley and 100° F. at Fort Yukon have been recorded. Mean monthly temperatures vary from a low of - 22° F. in January (at Fort Yukon) to 60° F. in July (at Fairbanks). Growing season lengths range from about 63 days (minimum) at McKinley Park to as much as 93 days at Bethel. [41]

The possible daily hours of growing season sunshine vary with latitude. In June, the lower latitudes can receive 16 hours of sunshine per day; northern portions of the sub-biome, 24 hours. However, cloud cover limits the amount of solar radiation actually received. Even in interior Alaska there are nearly as many cloudy days as clear ones during the growing season. [42]

Over much of the Taiga, severe climate and organic (peat) soils have combined to create a condition of permanently frozen ground (permafrost). Here, the mean temperature of the warmest month is below 50° F., and only the top layer of soil thaws during the warm season. [43] The southern limit of continuous permafrost lies just south of the Brooks Range, the timberline of which marks the northern boundary of the Taiga Coniferous Forest. South of the continuous permafrost area, discontinuous permafrost occurs over most of the Taiga to its southern limit. [44]

H. Vegetation

The vegetation found in the biomes considered in this statement may include a variety of threatened or endangered vascular plants and critical habitat for these plants. A listing and review of over 3,000 vascular plants submitted to the Fish and Wildlife Service by the Smithsonian Institution has been distributed through publication in the July 1, 1975, Federal Register.

The notice in the Federal Register acts as a "notice of consideration" for the listed vascular plants. The list has been distributed to all BLM districts. Planning is now in process to cooperate with other state and federal agencies and universities to determine status and critical habitat of the plants identified in the listing by states.

1. Terrestrial Vegetation

Coniferous trees are the predominant form of vegetation covering extensive areas ranging from the Pacific Coast, including Alaska, to the eastern foothills of the Rocky Mountains. Within the Coniferous Forest Biome, the identifying life-form is the needle-leafed evergreen tree (spruces, firs, pines, Douglas-fir, hemlocks and cedars), one or more of which is predominant in forest stands. This description, therefore, concentrates heavily upon the forest; associated plant communities such as alpine meadows are only briefly mentioned or omitted entirely.

For the purpose of describing vegetation, the Montane Sub-Biome has been subdivided into two regions. Each region in turn is stratified into vegetational "zones" as influenced primarily by elevation. The Northwest Coastal Sub-Biome is divided directly into vegetational zones, omitting the regional breakdown. Two general types of forest are usually recognized in the Taiga.

Within each vegetational zone, numerous plant communities exist, some of which may be identifiable on the basis of species (trees, shrubs and herbs) present and their abundance. Since these plant communities develop in relation to the sum of environmental factors acting on the specific forest area, they may therefore be used (given adequate knowledge) to indicate the presence of such factors. Historically, fires have played a significant role in influencing and maintaining certain species and associations.

Throughout the biome, the ease by which new forests can be regenerated may be predicted by determining whether environmental factors combine to produce a relatively "cool and moist" site or a relatively "warm and dry" one. Accordingly, this section identifies plant species generally adapted to these two categories for zones where information is readily available.

a. Taiga Coniferous Forest

In general, the Taiga can be characterized as a number of virgin forests located along major river drainages consisting of overmature stands of white spruce and related species (Photo II-2).

PHOTO II-2: Taiga Forest-Alaska. These forests consist mainly of overmature white spruce and black spruce.

PHOTO II-3: Northwest Coastal Forest-western Oregon. These forests are comprised mainly of old-growth Douglas-fir.

Vegetation in interior Alaska[44] forms a mosaic of patterns that is related in part to past fire history, to slope and aspect, and to the presence or absence of permafrost. Two general forest class-ifications are recognized:

(1) *White Spruce Forest*. Spruce-hardwood forests with closed canopies are typical of "warm" dry uplands (east, south and west exposures) and well drained flood plains along the glacial rivers. This forest is characterized by the usual successional process of (1) fire, to (2) hardwoods such as willow *(Salix)* quaking aspen *(Populus tremuloides)*, paper birch *(Betula papyrifera)* and balsam poplar *(Populus balsamifera* to (3) white spruce *(Picea glauca)*. Other hardwoods and shrubs common at some point during the successional period include alder *(Alnus)*, bearberry *(Arctostaphylos uva-ursi)*, red-fruit bearberry *(A. rubra)*, Labrador tea *(Ledum groenlandicum)*, narrowleaf Labrador tea *(L. decumbens)*, American red currant *(Ribes triste)*, prickly rose *(Rosa acicularis)*,willow buffalo-berry *(Shepherdia canadensis)*, mountain cranberry *(Vaccinium vitis-idaea)*, bog blueberry *(V. uliginosum)*, highbush cranberry *(Viburnum edule)*, and dwarf blueberry *(Vaccinium caespitosum)*. The forest floor is usually carpeted with a thick moss mat.

(2) *Black Spruce Forest*. "Open, low-growing spruce forests" are typical of north-facing slopes and poorly drained lowlands, usually underlain by permafrost. This forest generally lacks the successional characteristic of the previously described forest since the major forest tree, black spruce *(Picea mariana)*, is a pioneer species. Tamarack *(Larix laricina)* and white spruce are associated coniferous trees. Common hardwoods and shrubs include paper birch, red-fruit bearberry, crowberry, Labrador tea, prickly rose, willow, bog blueberry, and mountain cranberry. Subordinate vegetation consists of a thick moss mat, sedges, grasses and the above shrubs.

b. Northwest Coastal Forest

The Bureau-administered lands in this sub-biome can generally be characterized as a predominantly Douglas-fir forest, approximately 80 percent of which is comprised of old-growth stands 200 years in age and older (Photo II-3). These lands are intermingled with private lands that generally support a young-growth forest and in total are relatively well roaded due to past and current timber harvesting activities.

This is the most densely forested region in the coniferous biome and generally regenerates easily and quickly, grows rapidly and produces trees of impressive size. Mature forests usually have lush understory, shrub and herbaceous layers comprised of shade-tolerant conifers, shrubs, ferns, other herbs, mosses and liverworts.

Plant succession in the Northwest Coastal Sub-Biome following removal of forest vegetation usually proceeds through three stages, (1) rapid growth of residual and invading herbaceous plants (such as grasses and ferns), (2) gradual development into a shrub-dominated condition and (3) development of the young-growth forest. Stages one or two, or both, may not occur depending upon environmental factors. Either of the first two stages may also dominate for exceedingly long periods of time, also due to environmental factors. There is an especially strong tendency to develop dense shrub and hardwood communities of moisture-loving species (such as alder, salmonberry and huckleberry) where moisture is abundant.

Franklin and Dyrness have identified five, major, coniferous dominated vegetation zones within the sub-biome; they include (1) the coastal "Sitka Spruce Zone," (2) the widespread inland low to mid-elevational "Western Hemlock Zone," (3) the higher elevational "Pacific Silver Fir Zone," (4) the sub-alpine "Mountain Hemlock Zone," and (5) "Timberline." 45

Major tree species found within the Northwest Coastal Sub-Biome and their occurrence within the major zones are shown on Table II-1.

Throughout the Sitka Spruce and Western Hemlock zones (both more commonly known together as the Coastal Douglas-fir region) which are the predominant zones, relatively "cool-moist" and "warm-dry" sites may be indicated by the presence (usually in abundance) of the species indicated on Table II-2.

Port-Orford-cedar (Chamaecyparis lawsoniana) is a natural component of timber stands on sites of almost any moisture regime in extreme southwestern Oregon. It is currently endangered by a killing root disease (Phytophera lateralis) and has nearly been eliminated from moist sites and could eventually be eliminated from most of its natural range.

c. Montane Coniferous Forest

Generally, the Bureau-administered forests in the Montane are comprised of overmature stands located on scattered lands that have undergone moderate development due to timber harvesting, mining and other activities.

Table II - 1

NORTHWEST COASTAL SUB-BIOME

SPECIES OCCURRENCE BY ZONES

	*	*	ZONES		
Species	Sitka Spruce	Western Hemlock	Pacific Silver Fir	Mountain Hemlock	Timberline
Western White Pine (*Pinus monticola*)	4	3	2	3	4
Sugar Pine (*Pinus lambertiana*)	4	3	3	3	4
Whitebark Pine (*Pinus albicaulis*)	4	4	4	2	1
Lodgepole Pine (*Pinus contorta*)	1	4	2	3	3
Ponderosa Pine (*Pinus ponderosa*)	4	3	4	4	4
Western Larch (*Larix occidentalis*)	4	4	3	3	4
Engelmann Spruce (*Picea engelmannii*)	4	4	2	2	2
Sitka Spruce (*Picea sitchensis*)	2	3	4	4	4
Western Hemlock (*Tsuga heterophylla*)	1	1	2	3	4
Mountain Hemlock (*Tsuga mertensiana*)	4	4	2	2	2
Douglas-fir (*Pseudotsuga menziesii*)	1	1	2	3	4
Grand Fir (*Abies grandis*)	2	2	3	4	4
Pacific Silver Fir (*Abies amabilis*)	4	3	1	2	3
White Fir (*Abies concolor*)	4	4	4	4	4
Noble Fir (*Abies procera*)	4	3	2	3	4
Shasta Red Fir (*Abies magnifica*)	4	4	3	3	3
Subalpine Fir (*Abies lasiocarpa*)	4	4	2	2	2
Redwood (*Sequoia sempervirens*)	2	4	4	4	4
Incense-Cedar (*Libocedrus decurrens*)	3	2	3	4	4
Western Redcedar (*Thuja plicata*)	2	2	3	4	4

*zones containing significant amounts of BLM acreage.

Legend: 1 = abundant
2 = common
3 = uncommon
4 = rare or absent

TABLE II - 2

Species (X-Presence)	SITE	
	Cool-Moist	Warm-Dry
TREES (C - Canopy only, R - Reproducing under canopy)		
Douglas-fir (*Pseudotsuga menziesii*)	X(C)	X(R)
Incense Cedar (*Libocedrus decurrens*)		X
Ponderosa Pine (*Pinus ponderosa*)		X
Sitka Spruce (*Picea sitchensis*)	X	
Western Hemlock (*Tsuga heterophylla*)	X	
Western Redcedar (*Thuja plicata*)	X	
BROADLEAF TREES OR SHRUBS		
Red Alder (*Alnus rubra*)	X	
Pacific Madrone (*Arbutus menziesii*)		X
Golden Chinkapin (*Castanopsis chrysophylla*)		X
Oregon White Oak (*Quercus garryana*)		X
Ocean Spray (*Holodiscus discolor*)		X
Salal (*Gaultheria shallon*)		X
California Hazel (*Corylus cornuta calif.*)		X
Rhododendron (*Rhododendron macrophyllum*)		X
Poison Oak (*Rhus diversiloba*)		X
Rose (*Rosa*)		X
Creeping Snowberry (*Symphoricarpos mollis*)		X
Devils Club (*Oplopznox horridum*)	X	
Salmonberry (*Rubus spectabilis*)	X	
Oregon Myrtle (*Umbellularia california*)	X	
HERBS		
Swordfern (*Polystichum munitum*)	X	
Deerfern (*Struthiopteris spicant*)	X	
Ladyfern (*Athyrium filix-femina*)	X	
Brackenfern (*Pteridium aquilinum*)		X
White Inside-Out Flower (*Vancouveria hexandra*)	X	
Three Leaved Coolwort (*Tiarella trifoliata*)	X	
Sweetscented Bedstraw (*Galium triflorum*)	X	
Oregon Oxalis (*Oxalis oregana*)	X	
Whipple Vine (*Whipplea modesta*)		X

The sub-biome is scattered over extensive areas in the mountainous regions of the contiguous western states and differs from the adjacent Northwest Coastal Forest in that it generally reproduces with difficulty or grows slowly and has a relatively open canopy with sparse understory, shrub, and herbaceous layers (exceptions are commonplace) (Photos II-4 and II-5). Plant succession in this sub-biome usually follows the three stages outlined for the Northwest Coastal Forest (herbs to shrubs to trees). To facilitate the vegetative description, the Montane Sub-Biome is divided into two regions, (1) "Southwestern Oregon - Northwestern California - Sierra Nevada," and (2) "Eastern Oregon - Eastern Washington - Rocky Mountains."

(1) Southwestern Oregon - Northwestern California - Sierra Nevada.[46-48] This region may be viewed as having six major elevational forest zones. These are: (1) the Sierra's "Ponderosa Pine Zone," (2) the "Mixed Conifer and Mixed Evergreen Zone," (3) the "White Fir Zone," (4) the "Red Fir Zone," (5) the "Mountain Hemlock Zone," and (6) "Timberline." With one major exception, these zones are generally in elevational sequence where elevational differences are sufficient to include them. The exception is in southwestern Oregon and northwestern California where the Ponderosa Pine Zone is absent.

Major tree species found within this region and their occurrence within the major zones are estimated as shown on Table II-3.

Within the "Mixed Conifer - Mixed Evergreen" and possibly within the White Fir Zones, which are the predominant zones, relatively "cool-moist" and "warm-dry" sites may be indicated by the plants (usually in abundance) in forests stands as listed in Table II-4.[49, 50]

A notable, successional characteristic in the "Mixed Conifer - Mixed Evergreen" and "White Fir" zones is the extensive acreage dominated by brushfields comprised of dry-site species (such as manzanita and ceonothus) that have followed repeated fires.[51]

(2) Eastern Oregon - Eastern Washington - Rocky Mountain. This region may also be viewed in terms of elevational zones.[52-54] Four zones are generally found throughout the region. These include: (1) the (usually) lowermost "Ponderosa Pine Zone," (2) the mid-elevational Douglas-fir Zone, (3) the higher elevational "Englemann Spruce and/or Subalpine Fir Zone;" and (4) Timberline. Other zones are also present on a more localized basis such as (1) "Grand Fir" in eastern Oregon, eastern Washington and northern Idaho, (2) "Western Hemlock" in the same area, and (3) "Lodgepole Pine" in south-central and northwestern Oregon and in portions of the Rocky Mountain states. Daubenmire[55] recognizes additional communities as related to tree species demonstrating reproductive success; these are "Western Redcedar" and "Mountain Hemlock." Thus, throughout this region, an important distinction is that zones do not always occur in a single mountain, nor do they always occur in sequential belts.

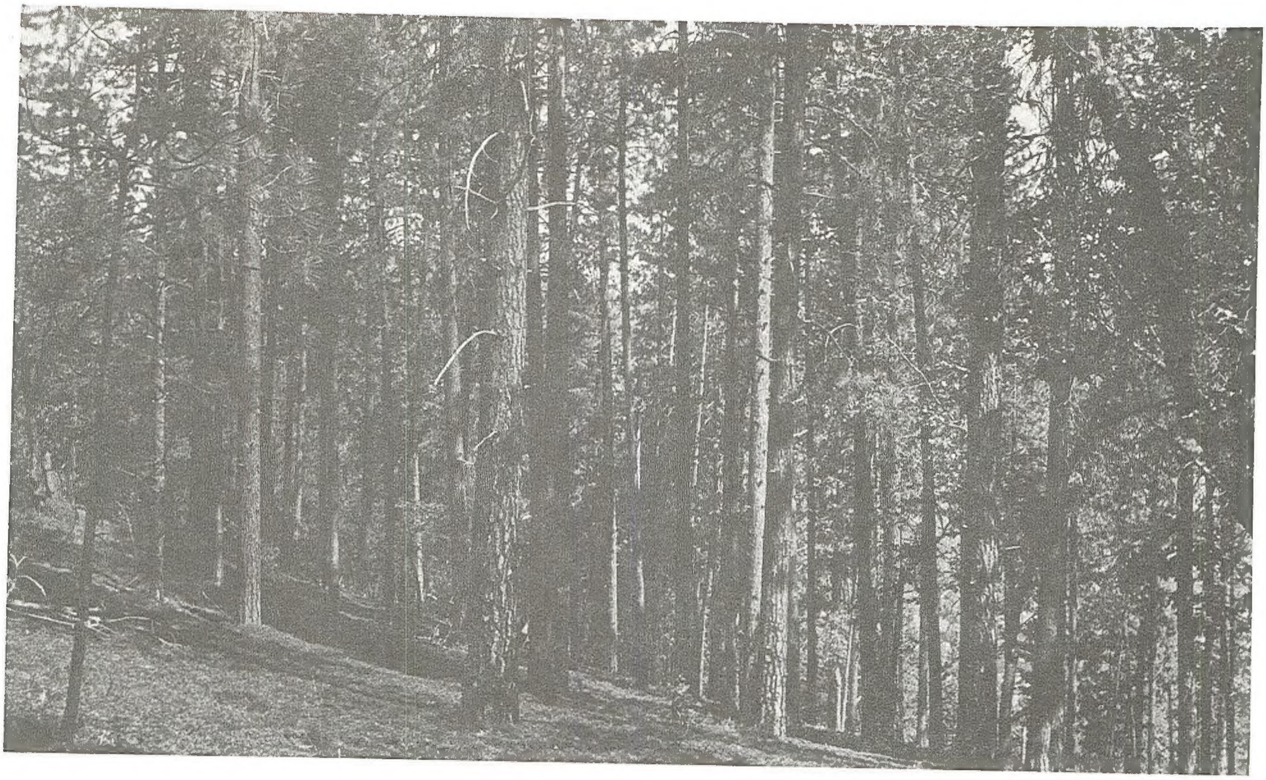


PHOTO II-4: Montane Forest-remaining forests. One of the principal commercial species is ponderosa pine.

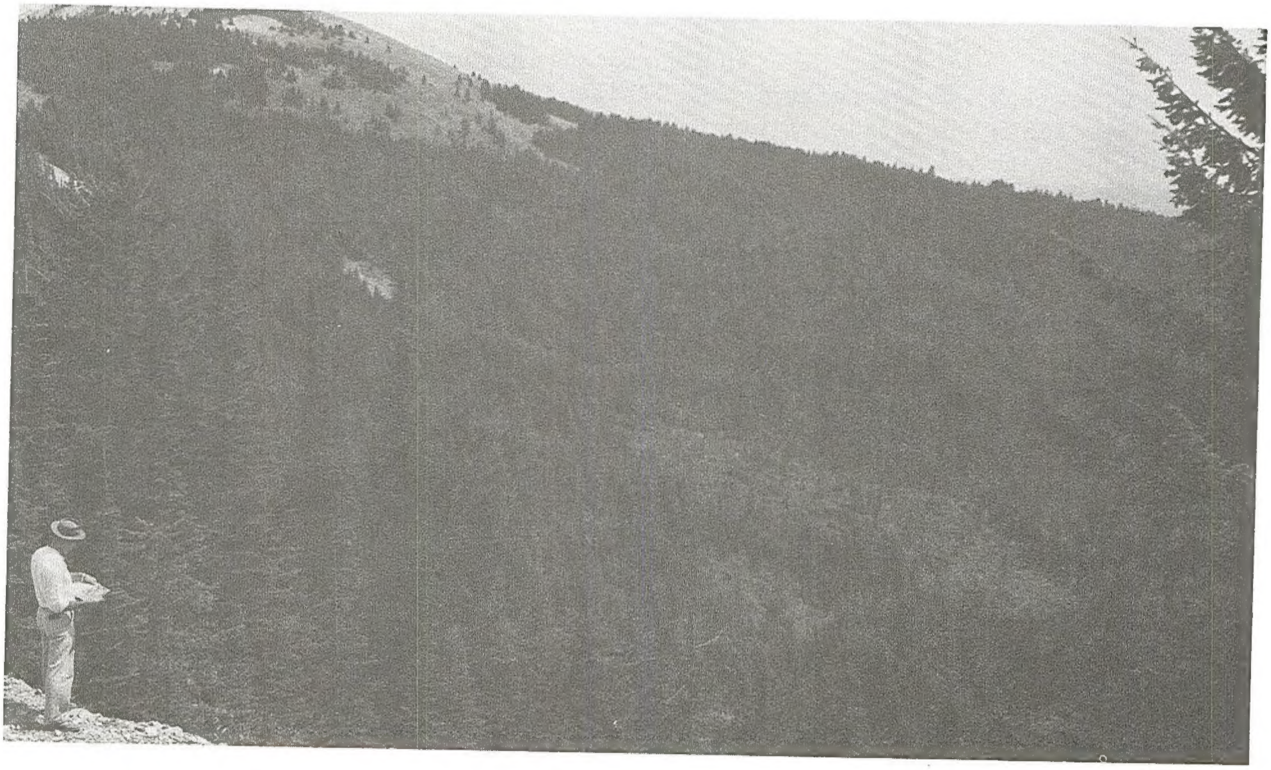


PHOTO II-5: Montane Forest-remaining forests. The mid and high elevations are characterized by Douglas-fir and subalpine fir.

TABLE II - 3

MONTANE SUB-BIOME

SPECIES OCCURRENCE BY ZONE

S.W. Oregon - N.W. Calif. - Sierra Nevada Region

	*	*	* ZONES			
Species	Pond. Pine	Mixed C. or E.	White Fir	Red Fir	Mount. Hem.	Timber-line
Western White Pine (*Pinus monticola*)	4	3	3	3	3	4
Sugar Pine (*Pinus lambertiana*)	2	2	3	3	3	4
Whitebark Pine (*Pinus albicaulis*)	4	4	4	3	2	1
Lodgepole Pine (*Pinus contorta*)	2	3	3	3	2	2
Ponderosa Pine (*Pinus ponderosa*)		1	2	3	4	4
Jeffrey Pine (*Pinus jeffreyi*)	2	3	3	4	4	4
Engelmann Spruce (*Picea engelmannii*)	4	4	4	3	3	3
Western Hemlock (*Tsuga heterophylla*)	4	3	4	4	4	4
Mountain Hemlock (*Tsuga mertensiana*)	4	4	4	3	1	2
Douglas-fir (*Pseudotsuga menziesii*)	2	2	2	4	4	4
Grand Fir (*Abies grandis*)	3	3	4	4	4	4
Pacific Silver Fir (*Abies amabilis*)	4	4	3	2	4	4
White Fir (*Abies concolor*)	2	2	1	3	4	4
Noble Fir (*Abies procera*)	4	4	4	3	4	4
Shasta Red Fir (*Abies magnifica*)		4	4	3	1	2
Subalpine Fir (*Abies lasiocarpa*)		4	4	4	3	2
Incense-Cedar (*Libocedrus decurrens*)	2	2	2	3	4	4
Western Redcedar (*Thuja plicata*)		4	3	3	4	4

* zones containing siginificant amounts of BLM acreage.

Legend:
1 = abundant
2 = common
3 = uncommon
4 = rare or absent

TABLE II - 4

	SITE	
Species (X - Present)	Cool-Moist	Warm-Dry
TREES		
Shasta Red Fir (*Abies magnifica*)	X	
Incense-Cedar (*Libocedrus decurrens*)		X
Western Hemlock (*Tsuga heterophylla*)	X	
Western Redcedar (*Thuja plicata*)	X	
Tanoak (*Lithocarpus densiflorus*)		X
Pacific Madrone (*Arbutus menziesii*)	X	
Golden Chinkapin (*Castanopsis chrysophylla*)		X
Canyon Live Oak (*Quercus chrysolepis*)		X
Oregon White Oak (*Quercus garryana*)	X	
Calif. Black Oak (*Quercus kelloggii*)		X
SHRUBS AND HERBS		
Poison Oak (*Rhus diversiloba*)		X
Rose (*Rosa*)		X
Trailing Blackberry (*Rubus ursinus*)	X	
Vine Maple (*Acer circinatum*)	X	
Pacific Dogwood (*Cornus nuttallii*)	X	
California Hazel (*Corylus cornuta calif.*)	X	
Squaw Carpet (*Ceonothus prostratus*)	X	
Oregon Grape (*Berberis nervosa*)		X
Hairy Honeysuckle (*Lonicera hispidula*)		X
Western White Anemone (*Anemone deltoidea*)	X	
Hoary Manzinita (*Arctostaphylos canescens*)	X	
Heart-leaved Arnica (*Arnica cordifolia*)	X	
White-veined Wintergreen (*Pyrola picta*)	X	

Major tree species found within the region and their occurrence within the major zones are shown on Table II-5.

In the "Ponderosa Pine Zone," the importance of fire in shaping the vegetation is heavily stressed.[56] Generally, older ponderosa pines are more fire resistant than associated trees; hence, this species has dominated in the past. Fires may also substantially reduce shrub cover and favor increased grass cover, especially on dryer sites.

Relatively "cool-moist" and "warm-dry" sites can also be indentified by plant communities throughout the Ponderosa Pine Zone in Oregon, Washington, and northern Idaho.[57, 58] Species usually found in forest stands on these sites are listed in Table II-6.

2. Riparian and Aquatic Vegetation

Riparian and aquatic plants are a vital component of all aquatic ecosystems; and since they are relatively common to all three sub-biomes, they will be described on the basis of the Coniferous Forest Biome.

Aquatic plants and the associated riparian vegetation provide food and cover for insects, fish and other invertebrates as well as a variety of birdlife, fur bearers, certain big game species during some seasons, and other indigenous wildlife. A healthy growth of aquatic vegetation along stream banks and lake shores prevents soil erosion, gives additional protection to stream channels during extreme floods, and adds to the natural beauty of the biome. Some type of vegetation grows in or adjacent to nearly all waters of the biome, depending upon water depth and movement, available nutrients, suitable temperature, salinity, light for photosynthesis, time for growth to take place and the nature of outside impacts.

The aquatic environment is often classified as either running or standing water habitat. The running water habitat includes watersheds from the smallest mountain stream at high elevations to major rivers at relatively low elevations. Running water thus passes through the Coniferous Forest Biome and eventually enters the oceans or closed basins. Streams at higher elevations generally contain less aquatic vegetation than those at lower elevations due to cooler water, steeper gradients, and a lower concentration of nutrients.

TABLE II - 5

MONTANE SUB-BIOME

SPECIES OCCURRENCE BY ZONE

E. Oregon - E. Washington - Rocky Mountain Region

Species	ZONES * Pond. Pine	* Doug. Fir.	Grand* White Fir.	* West. Hem.	* Eng.Sp. Sub.Fir.	Timber-line
Western White Pine (Pinus monticola)	4n	4n	3n	1n	3n	4n
Whitebark Pine (Pinus albicaulis)	4n	4n	4n	4n	2n	1n
Lodgepole Pine (Pinus contorta)	2	2	2	2	2	3
Ponderosa Pine (Pinus ponderosa)	1	2	2	4	4	4
Western Larch (Larix occidentalis)	4n	2n	2n	4n	3n	3n
Engelmann Spruce (Picea engelmannii)	4	4	4	3	1	2
Blue Spruce (Picea pungens)	4	3	4	4	2	2
Western Hemlock (Tsuga heterophylla)	4	3	4	1	4	4
Mountain Hemlock (Tsuga mertensiana)	4	4	4	4	2	2
Douglas-fir (Pseudotsuga menziesii)	2	1	2	2	4	4
Grand Fir (Abies grandis)	3n	2n	1n	3n	4n	4n
White Fir (Abies concolor)	3s	2s	1s	3s	4s	4s
Subalpine Fir (Abies lasiocarpa)	4	4	4	4	2	2
Western Redcedar (Thuja plicata)	4	3	3	2	4	4

*zones containing significant amounts of BLM acreage.

n = northern portion of region only

s = southern portion of region only

Legend: 1 = abundant
2 = common
3 = uncommon
4 = rare or absent

TABLE II - 6

Species (X - Presence)	SITE Cool-Moist	 Warm-Dry
TREES		
Douglas-fir (*Pseudotsuga menziesii*)	X	
Grand Fir (*Abies grandis*)	X	
Western Juniper (*Juniperus occidentalis*)		X
Oaks (*Quercus*)		X
SHRUBS AND HERBS		
Common Snowberry (*Symphoricarpus albus*)	X	
Mallow Ninebark (*Physocarpus malvaceus*)	X	
Idaho Fescue (*Festuca idahoensis*)		X
Bluebunch Wheatgrass (*Agropyron spicatum*)		X
Needle & Thread (*Stipa comata*)		X
Bitterbrush (*Purshia tridentata*)		X
Blue Wildrye (*Elymus glaucus*)		X
Elk Sedge (*Carex geyeri*)	X	
Mountain Mahogany (*Cercocarpus*)	X	
Wheeler Bluegrass (*Poa nervosa*)	X	
Strawberry (*Fragaria*)	X	
Fireweed (*Epilobium angustifolium*)	X	
Hawkweed (*Hieracium*)		X

Standing water habitats of lakes, reservoirs, ponds, marshes and bogs are all found in the biome. A greater variety and more profuse growth of aquatic plants usually occurs in standing rather than in running water habitats. Marshes and ponds are shallow-water habitats. Lakes are generally classified into three major groups according to their geologic age: young, mature and old, and having the following characteristics of productivity and aquatic vegetation. 59

- Young. Geologically young, less productive lakes, deep with narrow shoals or none, clear water of blue to green color, low in nitrogen and phosphorous, low in phytoplankton (both macroscopic and microscopic plants, including algae), and few littoral plants (macrophytes or higher, vascular plants).

- Mature. Geologically more mature and productive lakes, usually shallow with broad shoals, color green to yellow and brownish green with low transparency, rich in nitrogen and phosphorous, rich in phytoplankton with dense blooms, and littoral plants abundant.

- Old. Lakes in bog surroundings or in geologically old land areas, acidic waters yellow to brown with low transparency, low in nitrogen and phosphorous, phytoplankton low with rare blooms, few littoral plants, but rich in humic materials.

Most young lakes are found at higher elevations throughout the Coniferous Forest Biome, whereas mature lakes occur at all elevations. Mature lakes, ponds and marshes (both marine and freshwater, including estuaries) are areas of enormous biological productivity because of the rich waters and abundant communities of aquatic vegetation.

Aquatic plants are usually grouped into three general categories: free-floating, submersed, and emersed. Representative plant species of each group common to all parts of the Coniferous Forest Biome are listed as follows: 60-63

- Free-floating. Green and blue-green algae, duckweed (Lemna).

- Submersed. Stonewort or muskgrass (Chara), bladderwort (Utri-cularia), pondweed (Potamogeton) sometimes immersed, water milfoil (Myriophyllum), and mare's tail (Hippuris).

- Emersed. Floating pondweed, water shield (Brasenia), pond lily (Nuphar), cattail (Typha), bulrush (Sciprus), burreed (Sparganium), buttercup (Ranunculus), sedge (Carex), marsh yellow cress (Rorippa), horsetail (Equisetum), spike-rush (Elecocharis), mannagrass (Glyceria), slough grass (Beckmannia), reed canary-grass (Phalaris), cotton-grass (Eriophorum), peat moss (Sphagnum), arrow-grass (Triglochin), and willow.

Aquatic plants tend to grow in communities depending on water depth, which appears to be the major habitat requirement of most species. In aquatic ecosystems some plants occur in open water, others occupy the littoral zone, (shallow area occupied by vascular plants) and different species grow along the shores of lakes and banks of rivers.

Plant communities are readily apparent in a typical standing water environment. Algae occurs in deep, open water. Duckweed is also found floating in deep water but may also occur at all water depths. Rooted vegetation is restricted to the littoral zone where light penetrates. Here, beds of submersed plants (water milfoil, pondweeds, muskgrass) occur. As water depth decreases in inshore areas, submersed species give way to emersed plants like floating pondweed, pond lily, cattail, and bulrush. Vegetation dominating the shallowest water and shoreline includes mannagrass, buttercup, water cress, burreed, sedge, and willow.

Plant communities in standing water environments are constantly changing due to natural processes and eutrophication (natural enrichment). Shoal areas are first developed by sedimentation from shore erosion and tributary streams. Rooted vegetation grows on the shoals and contributes to filling of lakes by retaining debris and sediment. Tributary streams continue to add more nutrients. Dense growth of emergent plants and mats of sphagnum moss extend outward from shore. Dead plant material accumulates and further fills the lake. Succession of grasses and sedges then converts the lake into marshes or bogs, and finally dry land. Plant succession is therefore an important factor in the gradual conversion of water bodies to land.

Some aquatic species are adaptable to wide variations in the environment. The same species are often found in widely diverse situations of water temperatures, quality, and velocity.[64] They can often survive adverse growing conditions. Examples of cosmopolitan species found throughout parts of the Coniferous Forest Biome were previously listed by genera. Other species are restricted in distribution to more specific conditions; e.g., eel grass (*Zostera marina*) is an important marine species found along rocky ocean shores and in estuaries bordering the Northwest Coastal Forest. The distribution of many other species is dependent upon altitude and associated climatic differences. The coastal stellate sedge (*Carex phyllomanica*) grows in coastal marshes of the Northwest Coastal Forest whereas the Carter Lake sedge (*C. campylocarpa*) occurs in alpine and subalpine aquatic habitats of Oregon and Washington.

Associated with the aquatic environment is the riparian vegetation that grows on the banks of water bodies such as creeks, rivers and lakes.

Riparian vegetation can include nearly all types of vegetation such as herbs, grasses, shrubs and trees. Representative plant species common to all parts of the Coniferous Forest Biome are listed as follows: 122

Herbs and grasses. Horsetail (*Equisetum*), swordfern (*Polystichum munitum*), reed canary grass (*Phalaris*), arrow-grass (*Triglochin*).

Shrubs. Willow (*Salix*), Rose (*Rosa*), Salmonberry (*Rubus spectabilis*), California hazel (*Cooylus cornuta californica*), ocean spray (*Holodiscus discolor*).

Trees. Red alder (*Alnus rubra*), Western red cedar (*Thuja plicata*), Quaking aspen (*Populus tremuloides*), Douglas-fir (*Psudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*).

I. Animals

1. Wildlife-Terrestrial 65-74

A wide variety of terrestrial animals is found in the Coniferous Forest Biome. Under pristine conditions, the three basic requirements of food, water and cover are usually well met for most species. These basic requirements, however, may not always be well distributed throughout the biome. This biome produces a conifer overstory from timberline to the ocean, and from above the Arctic Circle to near the Mexican border. Some adaptable species are found throughout the biome. Others are much more specific in their requirements. In general, the Coniferous Forest Biome is characterized by the following terrestrial wildlife families.

- Mammals. Deer (*Cervidae*), bears (*Ursidae*), wolves, coyotes and foxes (*Canidae*), squirrels (*Sciuridae*), wildcats-cougar (*Felidae*), weasels (*Mustilidae*), voles (*Cricetidae*).
- Birds. Hawks (both *Accipitrinidae* and *Buteonidae*), eagles (*Buteonidae*), owls (*Tytonidae* and *Strigidae*), grouse (*Tetraonidae*), woodpeckers (*Picidae*), finches and sparrows (*Fringillidae*).
- Reptiles and Amphibians. True toads (*Bufonidae*), true frogs (*Ranidae*), garter snakes (*Colubridae*).

Wildlife typical of the biome are generally adapted to a closed canopy of coniferous timber interspersed with a variety of openings ranging from open meadows, swamps and bogs to rocky areas. Some species, such as the herbivores, respond to an edge effect created by forest meadows and by logging or fires that allow development of a nutritious understory of vegetation. Other species, including the raptors and larger predators, may respond adversely to loss of the timber overstory especially if it is accompanied by human activity. Accipter hawks and northern spotted owls depend on tree-dwelling mammals for their prey such as the red-backed mouse, red and flying squirrels, and the small birds that are found in forested areas. Bald eagles (Photo II-6) and ospreys need dead and dying trees adjacent to lakes, streams and the ocean for nest sites since their prey is principally fish. Cavity-nesting birds need dead and dying trees or snags for nestsites and food sources.

Many fur-bearers and birds in this biome are adapted to a semi-aquatic habitat; and the presence of streams, lakes and ponds add greatly to the variety of wildlife. In a so-called "virgin forest" this is usually not a limiting factor. Most forest wildlife can adapt to certain changes.

The following threatened or endangered wildlife species (in May 1974 federal listing) are found within the boundaries of the Coniferous Forest Biome:

- Northern Rocky Mtn. Wolf (Canis occidentalis) Wyoming and Montana
- San Joaquin Kit Fox (Vulpes velox) California
- California Condor (Gymnogyps califorianus) California
- Columbian Whitetailed Deer (Odocoileus virginianus columbianus)
- Black Footed Ferret (Mustela nigripes)
- Southern Bald Eagle (Haliaeetus leucocephalus)
  South of 40th parallel
- American Peregrine Falcon (Falco pergrinus anatum) U.S.A.
- Arctic Peregrine Falcon (Falco peregrinus tundrius) U.S.A.

PHOTO II-6: Bald Eagle. This is an important wildlife species of the Northwest Coastal Forest. Bald eagles inhabit dead and dying trees adjacent to lakes and streams.

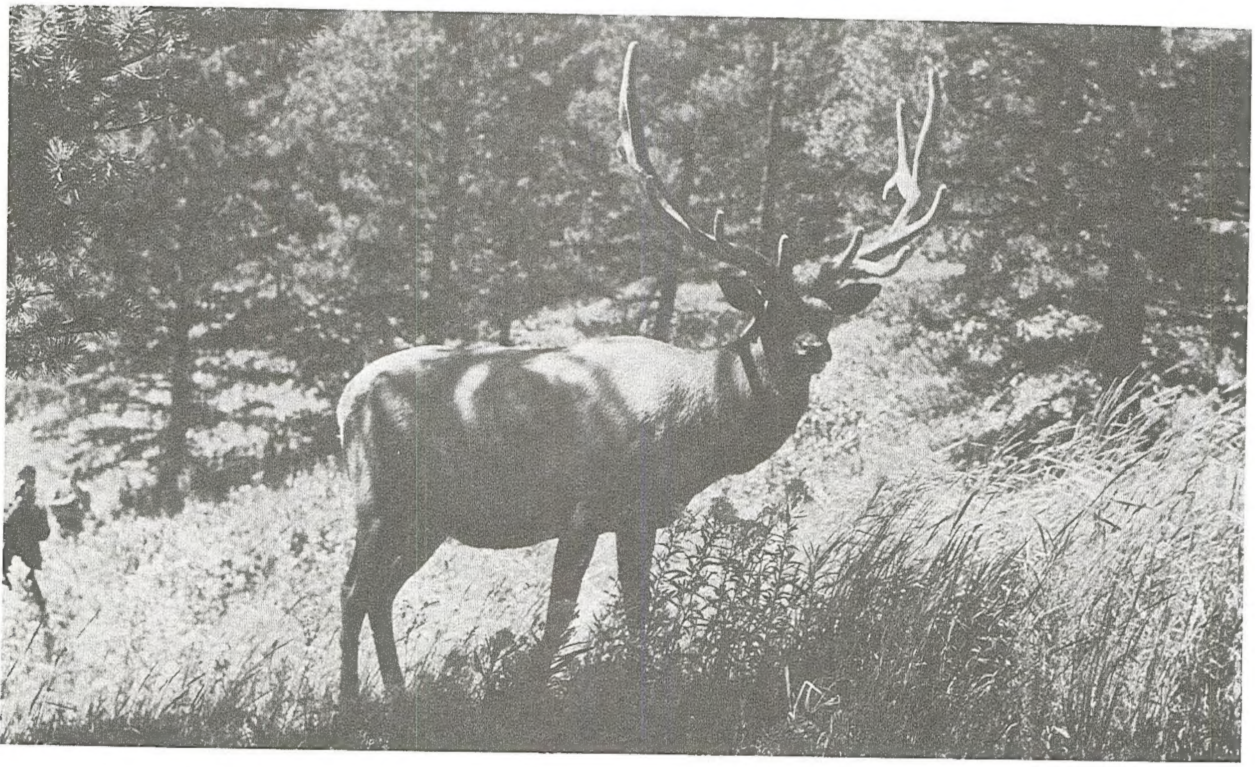


PHOTO II-7: Elk. Roosevelt elk and Rocky Mountain elk are common in the Northwest Coastal and Montane Forests respectively.

PHOTO II-8: Mule deer are common to the Montane Forest. In the Northwest Coastal Forest the black-tail deer is most common.

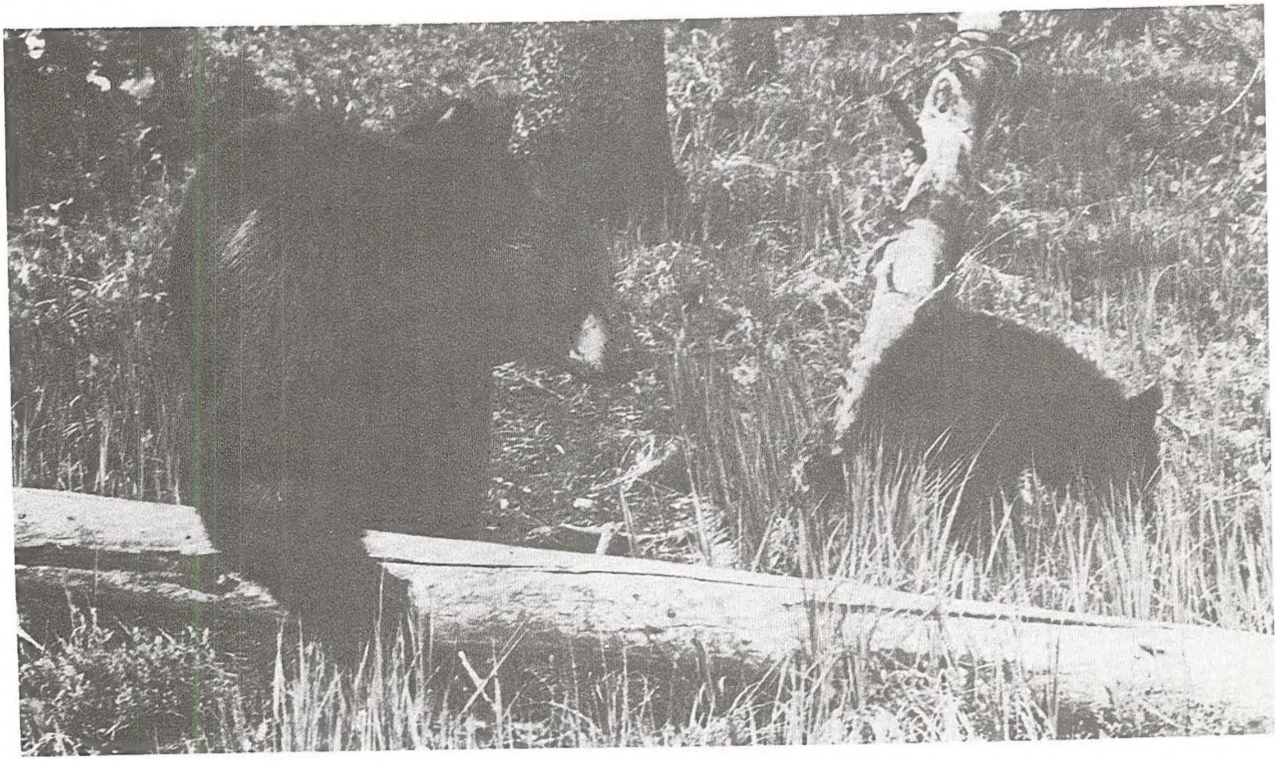


PHOTO II-9: Black bear is a typical wildlife species of both the Northwest Coastal and Montane Forests.

a. The Northwest Coastal Forest

This sub-biome supports wildlife habitat where water is usually not a severe limiting factor; humidity is high and the temperature range is narrow. There is usually a deep layer of duff and organic soil rich in micro-organisms. Forest with dense, closed canopies produce shade resulting in a poorly developed understory. Wildlife typical of the Northwest Coastal Forest are:

- **Mammals**. Roosevelt elk *(Cervus canadensis roosevelti)*, black-tailed deer *(Odocoileus hemionus columbianus)*, black bear *(Euarctos americanus)*, bobcat *(Lynx rufus)*, lynx *(Lynx canadensis)*, cougar *(Felis concolor)*, coyote *(cani latrans)*, mountain beaver or sewellel *(Aplodontia rufa)*, white-footed deer mouse *(Peromyscus maniculatus)*, snowshoe hare (Lepus *americanus)*, Douglas chickaree *(Sciurus douglasii)*, mink *(Mustella vison)*, wolf *(Canis lupus)*.

- **Birds**. Pacific horned owl *(Bubo virginianus pacificus)*, northern spotted owl *(Strix occidentalis caurina)*, Cooper's hawk *(Accipter cooperi)*, bald eagle, sooty grouse *(Dendragapus fuliginosus)*, winter wren *(Nannus hiemalis pacificus)*, band-tailed pigeon *(Columba fasiata fasciata)*, warblers *(Parulidae)*, thrushes *(Purdidae)*, sparrows and finches *(Fringillidae)*, jays *(Tyrannidae)*, waterfowl *(Anatidae)*, shorebirds *(Cheradiidae)*.

- **Amphibians and Reptiles**. Pacific giant salamander *(Dicumptodon ensatus)*, Puget Sound garter snake *(Thamnophis sirtalis)*, true toads *(Bufonidae)*, turtles *(Testuninidae)*.

Other wildlife are found in more specific vegetative zonal types; the hemlock looper *(Ellopis fascellaria lugubrosa)* and the Sitka spruce beetle *(Dendroctonus obesus)* are serious insect defoliators found in the Sitka spruce zone.

In the western hemlock (or coastal Douglas-fir) zone, the little Trowbridge's shrew *(Sorex t.* trowbridgii.), an insectivore, also feeds on Douglas-fir seed. The Douglas-fir bark beetle *(Dendroctonus pseudotsugae)* is also found in this zone.

The fisher *(Martes pennanti pacifica)* and the flammulated owl *(Otus flammeolus)* are found in the silver fir and hemlock zones below timberline.

Above timberline the alpine zone is typified by the ptarmigan *(Lagopus)* and the white-crowned sparrow *(Zenotrichia leucophrys)*.

Most of the general habitat requirements previously mentioned pertain to this sub-biome. This sub-biome has greater ability to rapidly produce desirable habitat following fires, logging, and other disturbances than the Taiga or Montane forests. This is due to the sites, soils, moisture, and elevations. Water is not usually a limiting factor.

Deer and elk generally follow any natural or man-made opening of the dense overstory, such as caused by fires or logging, to take advantage of resulting nutritious ground vegetation.

The cougar, black bear, northern lynx, and Alaskan grizzly bear inhabiting this sub-biome are wilderness species that need the seclusion and escape cover afforded by dense forests.

Many of the small mammals and birds and amphibians found in coastal forests depend on the variety of insect life that abounds in the damp, mild environment as well as the great mass of nutritious seeds produced by evergreen trees.

Mink, marten, otter, beaver and muskrat thrive in this habitat due to the proximity of lakes and streams that provide food, bank dens, and travel routes. While waterfowl are not normally considered as representative birds of timbered habitat, many ducks use the lakes, rivers and estuaries adjacent to the moisture-holding forest lands. Some ducks including the golden-eye, bufflehead, and wood duck nest in tree cavities adjacent to water.

b. *Montane Coniferous Forest*

A greater variety of habitat exists in this sub-biome than in the coastal forest or Taiga due to the variety of vegetative types allowing a high degree of use by adapatable wildlife. Some 56 species of breeding birds have been recorded in the central Rocky Mountains. Representative wildlife includes:

- *Mammals*. Rocky mountain elk (*Cervus canadensis nelsoni*), mule deer (*Odocoileus hemionus hemionus*), mountain goat (*Oreamnos americanus*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*), cougar, black bear, fisher (*Martes pennanti*), pika (*Ochotona princeps*), Rocky Mountain cotton-tail (*Sylvilagus muttalli*).

- *Birds.* Golden eagle (*Aquila chrysaetos canadensis*), screech owl (*Otus asio*), grey-crowned rosy finch (*Leucosticte tephrocotis*), three-toed woodpecker (*Picoides tridactylus*), white-tailed ptarmigan (*Lagopus leucurus*), American magpie (*Pica pica budsonia*), Clark's nutcracker (*Nucifraga columbiana*).

- *Amphibians and Reptiles*. Pacific tree frog (*Hyla wrighorum*), California mountain kingsnake (*Lampropelis zonata*).

As with the coastal forest sub-biome, many other wildlife species are found by regions of the biome.

The southwestern Oregon-northern California area has such typical species as the ringtailed cat or cacomistle (*Bassariscus astutus oregonus*) found along the lower areas of the "mixed conifer-mixed evergreen" zone. The Douglas ground squirrel (*Otospermophilis grammurus douglasii*) is common in the mixed forests of this area. The California or acorn woodpecker (*Balanosphyra formicivora*) also represents this area, and the northern Pacific rattlesnake (*Crotalis viridis*) is present in the transition zone area. Destructive beetles, such as the bark beetle (*Ips emarginatus*), infest ponderosa pine. This zone may have heavy, black-tailed deer concentrations rather than mule deer popluations.

The eastern Oregon - Washington and northern Rockies portion of the Montane forest may be represented by the Cascade hoary marmot (*Marmota caligata canadensis*), mountain caribou (*Rangifer montanus*), moose (*Alces americana shirasi*), grizzly bear (*Ursus horribilis*), American pipit (*Anthus spinoletta*), and the boreal toad (*Bufo boreas*).

In the central and southern Rockies, the Kaibab squirrel (*Sciurus kaibabensis*) and the tawny deer mouse (*Peromyscus maniculatus rufinus*) are important species.

Water can be a limiting factor in the Oregon wildlife habitat of this sub-biome. The diversity of habitat and climatic conditions produces a variety of wildlife. Woodpeckers make extensive use of the oaks and other hardwoods for food, food storage and nesting in parts of this sub-biome. Many other birds and small animals also use the cavities in dead and dying trees as nest and den sites. The many herbivores inhabiting this sub-biome utilize most of the upper areas as summer range. Deep snows and cold preclude year-round residency, especially for deer and elk. For survival, these ruminants seek suitable winter range within reasonable migration distance. High mountain meadows and the vegetation above timberline are typical sheep and goat year-round habitat.

As noted for other timbered areas, the larger predators (wolverine, wolves, grizzly bears, and cougar) require the privacy of wilderness to survive.

The open forests in the southern part of this sub-biome merge into the Upper Sonoran zones of California and the southern Rockies. These warm, dry, and open-timbered stands are inhabited by the birds, animals and reptiles using drier sites; they are typified by the Kaibab squirrel, ringtailed cat, rattlesnakes, lizards, and pinon jay.

c. Taiga Coniferous Forest

Most of the animals in the Taiga Forests are shy and retiring. They can tolerate cold winters with much snow. The herbivores are largely browsers. Some, such as the moose, snowshoe hare, and grouse, depend (at least in part) upon broad-leafed plant communities found in burns, natural openings or along streams.

The Taiga has an important seasonal cycle conspicuous in the winter dormancy of many of its invertebrates and vertebrates, and in the spring influx and autumn departure of migratory birds. Outbreaks of certain insects, particularly bark beetles and defoilators, result in destruction of large areas of forest. About fifty species of insects are important. The spruce budworm and the tent caterpillar are endemic everywhere.

Animals commonly found in the Taiga include:

- *Mammals.* Wolverine (*Gulo luscus*), lynx (*Lynx canadensis mollipilosus*), snowshoe rabbit (*Lepus americanus*), red squirrel (*Tamiasciurus hudsonicus*), Arctic caribou (*Rangifer torandus*), moose (*Alces gigas*), Alaska porcupine (*Erithizon epixanthum myops*), Alaska least weasel (*Mustela rixosa*), Northern flying squirrel (*Glaucomys sabrinus*), Alaska marten (*Martes americana*), hoary bat (*Nycteris cinera*), wolf (*Canis lupus*).

The moose, Dall sheep, and mountain caribou are found primarily in the timbered mountains of the southern part of this subbiome.

- *Birds.* Gyrfalcon (*Falco rusticolus obsoletus*), snowy owl (*Nyctea nyctea*), Arctic horned owl (*Bubo virginianus subaracticus*), spruce grouse (*Canachites canadensis*), ptarmigan (*Lagopus leucurus*), Arctic three-toed woodpecker (*Picoides arcticus*).

- *Reptiles and Amphibians.* True frog (*Rana sylvatica*).

Habitat requirements in the Taiga, although generally sparse, do provide necessary winter shelter as well as food for browsing herbivores, and other birds and animals. The adaptable caribou can dig through two feet of snow and reach the desirable reindeer mosses, sedges, and lichens if the more favored browse species are not available.

Predator-prey relationships are present, such as the lynx and great horned owl, which are primarily dependent upon the hare.

2. Wildlife - Aquatic 75-81

The aquatic animal communities in the Coniferous Forest Biome of the western United States are of rather specific diversity and species. The biome is generally characterized by high quality, low temperature, near-neutral water which contains numerous aquatic organisms. This biome also supports significant warm-water fisheries and high quality, warm-water biotic communties. Presently, however, this aquatic environment is being underutilized and does not receive the attention of the cold-water aquatic community.

Lower elevation lakes and reservoirs are more productive if constant flushing does not cause loss of nutrients. The waters generally start at high elevations, especially in the Montane Sub-biome. The large rivers formed from tributary streams may have significant changes in water quality from higher to lower elevations and provide subtle changes in the aquatic ecosystems. In general, the Coniferous Forest Biome is characterized by some of the following aquatic animals:

- Fish. Trout, salmon and whitefishes - (Salmonidae)
- Invertebrates. Freshwater clams and mussels - (Pelecypoda)
  Freshwater shrimps and crayfish - (Decapoda)
  Mayflies, stoneflies and caddis - (Insecta)

In addition, the Northwest Coastal and Montane Biomes support striped bass, shad and sturgeon.

The following threatened or endangered fish are found in the Coniferous Forest Biome:

Gila trout (Salmo gilae), New Mexico; Lahontan cutthroat trout Salmo clarki henshawi), California, Nevada; Greenback cutthroat trout (Salmo clarki Stomias), Colorado; Paiute cutthroat trout (Salmo clarki seleniris); Humpback chug (Gila cypha), Arizona, Utah, Wyoming; Colorado River squawfish (Ptychocheilus lucius) Colorado River system; Woundfin (Plagepherus argentissimus), Utah.

The aquatic animals typical of the biome are generally adapted to habitat conditions of the highest quality of food, water and cover. Water quality standards set by state and federal regulations may not be adequate for protection of these organisms. In many states, specific regulations are designed for waters in the higher elevation watersheds.

The animals have adapted to stream habitat that is generally of coarse material free of fine clays, sand and silt. Organisms that have adapted to slow moving and silt laden rivers are generally absent in Coniferous Forest waters. Some animals may be found in the transition areas, but are on the fringe of their normal habitat.

Water requirements considered optimum for complete life histories of most aquatic animals in the biome are as follows:

Dissolved oxygen	7 to 9 ppm
Hydrogen ion (pH)	6.8 to 7.8
Total dissolved solids	125 to 175 ppm
Turbidity	5 FTU or less
Water temperature	50° to 60° F.

Aquatic insects, phytoplankton and Crustaceans have adapted to larger substrate such as rocks and gravel. Streams have generally stabilized in heavy forested areas and contain optimum amounts of riffle and pool areas. Most streams develop the aquatic organisms in the faster moving riffle-gravel-rubble areas.

Fish have adapted to high water quality, low water temperatures and stabilized streambanks. Vegetation along streams is extremely important in keeping the protective cover and shading of the stream intact. For reproduction, salmonid fish need gravel ranging from 1/2 to 5 inches in diameter for deposition of eggs during spawning and rearing of the ova. Optimum size of the gravel depends on the species of fish. Good, clean, silt-free gravel is an important habitat requirement in the aquatic ecosystem of the Coniferous Forest Biome.

a. Northwest Coastal Coniferous Forest

The Northwest Coastal Sub-biome supports a major portion of anadromous salmon populations utilized by sportsman and exploited internationally by commercial fisheries. The five, following species of Pacific salmon are found in these waters.

Chinook salmon - (Oncorhynchus tshawytscha)
Sockeye salmon - (Oncorhynchus nerka)
Coho salmon - (Oncorhynchus kisutch)
Chum salmon - (Oncorhynchus keta)
Pink salmon - (Oncorhynchus gorbuscha)

The following indigenous trout characterize the sub-biome. These species provide a sport fishery of high importance in all of the Pacific Coast states and Canada.

Rainbow trout (steelhead) - (*Salmo gairdneri*)
Coastal cutthroat trout - (*Salmo clarki clarki*)
Dolly Varden trout - (*Salvelinus malma*)

Miscellaneous, indigenous fish typical to the sub-biome include species such as the following:

Whitefish - (*Prosopium williamsoni*)
Squawfish - (*Ptychoceheilus oregonensis*)
Red-sided shiner - (*Richardsonius balteatus balteatus*)
Coarse-scaled sucker - (*Catastomus macrocheilus*)
Pacific lamprey - (*Entosphenus tridentatus*)
Sculpins - (*Cottidae*)

The Northwest Forest Sub-biome also surrounds hundreds of important estuaries on the Pacific Coast where freshwater from the forest drainages meet and intermix with the salt water of the ocean. The estuaries support a variety of marine species and juvenile life stages of anadromous fish. Typical examples, in addition to the Pacific salmon, are:

Seaperches - (*Embiotocidae*)
Flounders - (*Pleuronectidae*)
Eulachon (smelt) - (*Thaleichthys pacificus*)
Dungeness crab - (*Cancer magister*)
Cockle clam - (*Clinocardium nuttalli*)
Washington clam - (*Saxidomus giganteus*)

Habitat requirements of aquatic organisms are generally the same as stated for the entire Coniferous Biome. It is emphasized that the special requirements for anadromous fish are especially important in the Northwest Coastal area. Adult fish migrating from the ocean through the estuaries and to the gravel spawning grounds need special consideration. During the migration period the fish may be able to pass through waters of high turbidity, but must have water of good quality on the spawning grounds. Routes of access to the spawning gounds must not be blocked by obstruction such as dams, culverts, or debris. The eggs, after deposition in the gravel, require high quality water and freedom from disturbance for periods up to three or four months. Fry and fingerling also need high quality water, cover, and food during their freshwater life period. Freshwater life of the small fish varies from a few months to several years depending on the species.

b. Taiga Coniferous Forest

The Taiga Forest Sub-biome provides an aquatic ecosystem characterized by high quality water, low water temperatures, alpine lakes, ponds and bogs in various stages of succession. The larger river systems contain commercially important populations of anadromous Pacific salmon.

The Alaska Bristol Bay sockeye fishery is of international importance and is one of the largest migratory animal popluations in the world.

Sockeye and chum salmon are the most numerous species in the Taiga. Other fish typical of the Taiga Forest are as follows:

Arctic grayling - (Thymallus arcticus)
Whitefish - (Coregonus sp.)
Inconnu (sheefish) - (Stenodus leucichthys)
Lake trout - (Salvelinus namaycush)

The freshwater environment in the Taiga is generally low in aquatic organisms. The reduced food supply combined with lower water temperatures provides a habitat contributing to the slow, freshwater growth rate of fish. The high quality water, however, provides a medium for good hatching and rearing of anadromous species of fish. Rapid growth is attained after the fish move into the productive estuaries and oceans.

A variety of planktonic animal forms provides most of the food in lakes for species such as the sockeye salmon. Other invertebrates important in these waters are aquatic insects such as mayflies, stoneflies, caddis and various diptera.

Habitat conditions in the Taiga are generally of a pristine nature. Many of the larger river systems are of glacial origin and are constantly turbid. These rivers access routes for the anadromous fish to the clear, high quality spawning and rearing tributaries. The character of most of the important fish-producing streams is preserved by a thin riparian stand of white spruce forest.

c. Montane Coniferous Forest

Migratory and anadromous species of fish are normally absent except in some areas of northern California, Idaho, and Oregon. Rivers and streams in the forested area are characterized by salmonid fish species such as trout and whitefish. Transition areas occur within the fringes of the Montane Forest because of changes in water quality, such as higher temperatures and turbidities. Transition areas are characterized by largemouth and smallmouth bass, northern pike, crappies and several species of cyprindids such as squawfish, chubs, and suckers. Salmonid populations are generally lower in these transition zones.

The high quality waters support freshwater clams and mussels along with good populations of Crustaceans and aquatic insects.

Typical fish in the Montane Forest Sub-biome are as follows:

Cutthroat trout - (Salmo clarki sp.)
Rainbow trout - (Salmo gairdneri)
Whitefish - (Coregonus and Prosopium)

Introduced trout and salmon have also become established and are now typical of the area, i.e.,:

Brook trout - (Salvelinus fontinalis)
Brown trout - (Salmo trutta)
Lake trout - (Salvelinus namaycush)
KoKanee (Land-locked red salmon) - (Oncorhynchus nerka)

Other fish distinctive to the sub-biome are:

Dace - (Rhinichthys sp.)
Suckers - (Catostomidae)

Probably the most important habitat requirement is silt-free water with temperatures of less than 70° F. Diversions of water for irrigation and a variety of consumptive uses are now impacting the aquatic habitat in this biome. Consistent water temperatures of over 70° F. during summer months invite a reduction of salmonid fish and an increase in warm-water species. A variety of land management abuses may increase the amount of silt in streams and lead to changes in aquatic fauna. Riparian vegetation along higher elevation streams is important in holding water temperatures below 70° F. for protection of salmonid fish.

3. Domestic Livestock

Livestock grazing occurs throughout the Coniferous Forest Biome with the exception of the Taiga. Grazing is most common in the open areas and sparse timbered stands where water and desirable forage species are available. Cattle, sheep and a few horses graze these areas as part of established livestock operations. Additionally, minor grazing takes place in connection with recreational activities. Most livestock use occurs between April 1 and October 31.

Domestic livestock utilize a variety of plant species in the Northwest Coastal and Montane Coniferous Forests. Some of the more common are: Blue wild-rye (Elymus glaucus), Kentucky blue-grass (Poa pratensis), tufted hairgrass (Deschampsia caespitosa) and mountain bromegrass (Bromus marginatus). The diet of domestic livestock consists primarily of grass and forbs during the spring and early summer months. As the season progresses, these plants mature and lose their high-protein content. Grazing use then shifts to browse species which have a higher protein content during the late summer and fall. Most domestic livestock use on forested lands is in mountain meadows and in the open forest stands where forage species grow among the scattered trees.

The Montane Coniferous Forest also provides habitat for wild, free-roaming horses and burros, the majority of which is outside western Oregon. Wyoming, Colorado and Montana contain some of the most significant wild horse range. Use of commercial forest land by wild horses and burros, however, is generally limited to the lower elevations and to open, grown stands of timber.

J. Micro and Macroorganisms

1. Soil Organisms

Throughout the Coniferous Forest Biome, minute forms of plant and animal life exist on or below the forest floor. These organisms are essential to the existence of higher plant forms and larger animals. They are also vital in the process of forming soil plant and animal residues.[82]

Each year most forest floors (with the probable exception of the Taiga) collect an average of two tons of plant and animal debris per acre.[83] This residue becomes the source of life for the minute soil flora and fauna which feed upon and gradually decompose the debris. The decomposition makes available for energy transfer the inorganic compounds necessary for the manufacture of new organic matter.

Microscopic forms such as bacteria, fungi, and certain molds and algae predominate. Microscopic protozoa are the most abundant animals. Other tiny animals such as mites and springtails may number 200 million per acre. Many of these minute plants and animals occur world-wide, including the Arctic tundra and the temperate and tropical forests.

Although many types of bacteria are normally present, their collective importance stems from their ability to decompose organic remains and increase the availability of nutrients through oxidation, evolution of carbon dioxide, and symbiotic association with the roots of trees and lesser vegetation. Fixation of atmospheric nitrogen into compounds which become available to forest vegetation is accomplished largely by bacteria. 84

Fungi and fungus mycelia play a part in the decomposition of all organic matter falling to the forest floor. They decompose proteins, cellulose, carbohydrates and lignins. Certain parasitic fungi invade living root tissues causing the eventual destruction of the plant. Other fungi develop symbiotic associations with the roots of trees and higher plants, permitting mutually beneficial exchange of carbohydrates, nutrients, and other growth-promoting substances. 85

Actinomycetes exhibit characteristics of both fungi and bacteria. Their importance is associated with their ability to produce antibiotics of high toxicity to certain pathogenic organisms. Certain actinomycetes form symbiotic unions with alder roots, permitting fixation of atmospheric nitrogen. 86

Other important forest soil organisms are Nematodes, rotifers, ticks, larvae, millipeds, centipedes, ants, beetles, spiders, and worms.

Although most of the foregoing soil organisms occur throughout the Montane and Northwest Coastal Coniferous Forests, their presence in the Taiga may be less abundant and restricted to the smaller forms.

Lichens also play an important role in plant and animal succession because of their role as pioneer organisms, food source to animals, and habitat for small invertebrates and micoorganisms. Lichens are especially important in the Taiga and alpine area as food for caribou and other wildlife.

2. Aquatic Organisms

Minute organisms that live in streams, lakes and estuaries form significant links in the energy flow of the aquatic ecosystem. While there are some variations in species composition between sub-biomes, aquatic organisms are herein described on the broad basis of the Coniferous Forest Biome.

Aquatic organisms fall into three basic classes, (1) autotrophic (self-nourishing) or producer organisms, chiefly tiny plants, (2) heterotrophic (other-nourishing) consumer organisms, chiefly animals, and (3) a second category of heterotrophics known as reducers, mostly bacteria and fungi.

- Autotrophic (producer). Green plants that assimilate inorganic nutrient minerals - usually by photosynthesis - into living organic substances. The largest group of energy producers are tiny algaes, diatoms, and flagellates. Collectively, they are at the bottom of the food chain. Those that are found floating free are known as phytoplankton.
- Heterotrophic (consumer). Animal organisms that feed upon and digest plant and other animal organic matter, releasing energy in the process. They occupy the next higher level in the food chain and are known as zooplankton. Included are microscopic protozoa and rotifers, and larger animals such as sponges, snails, worms and daphnia.
- Heterotrophic (reducers). Bacteria and fungi that decompose more complex organic remains, returning the inorganic minerals for reuse at the start of the energy cycle, releasing the remaining chemical energy in the process.

Stability of the aquatic ecosystem depends upon the degree of equilibrium achieved between the autotrophic and heterotrophic sectors.[87]

K. Human Settlement and Land Use

1. Montane Coniferous Forest

The history of white man's early settlement of the Montane Coniferous Sub-biome began with the search for gold and silver, fur bearing animals and exploration of newly acquired territory.

Although some early settlement had taken place in the southwest on Spanish land grants, it was only during the 1840's, after the West became United States territory, that the cross-country movement of pioneers gained momentum and the economic development of the West began.

Landform was the primary determinant of early settlement patterns. After crossing mountain saddles, the pioneers usually followed the rivers and valleys and spread out in the basins and plains. They preferred river banks and adjacent uplands for settlement. The rivers provided transportation, and the trees growing nearby provided wood for home construction and fuel.

Settlement gained momentum when the vanguard of settlers reached the plains. Settlement and development of the public domain was further facilitated through passage of various public land laws. These laws were designed to provide title to tracts of land, varying in size from 160 to 640 acres, upon compliance with occupancy and use conditions. Settlement envisioned by laws in force at that time (Timber and Stone Act, Preemption Act, Homestead Act, etc.) were meant to populate the nation and provide sustenance and homesteads to the people. Instead, graft and fraudulent manipulation of these acts often put the choice timberlands into the hands of timber companies and speculators.

Settlement, however, was only the initial step in development. Settlers who had located on the land could not remain isolated members of society. They were followed closely by churches and schools. Frontier towns and trading centers sprang up over the country. Travel to the West was greatly facilitated when, in 1869, the central transcontinental railroad was completed. Soon followed by other trunklines, these railroads pierced the frontier and ran ahead of settlement.[88]

Although settlement and development took place rapidly in the more fertile valleys and plains, the establishment of permanent settlements in the mountainous terrain that comprises the Montane Subbiome took place in a much different fashion. Characterized by steep, rugged topography with shallow, poorly developed soils, the mountains afforded little opportunity for homesteading. Exceptions occurred in sheltered, fertile valleys between the ranges.

Mining of gold and silver, and later timber harvesting, were the principal attractions of the western mountains. Although many of the early mining settlements have either disappeared or are ghost towns today, others, more favorably situated, survived. In certain locations, mining still provides significant income and employment. Many rural counties in Colorado, Idaho, Montana, Wyoming, Washington and Oregon which had their greatest population prior to 1920 have since declined in population. Large national forests and parks in the area have virtually no permanent year-round habitation. Forest products, mining, agriculture, and tourism are the main-stays of the economy. Lumbering and livestock grazing occur generally throughout the Montane Sub-biome.

Livestock grazing of the alpine meadows is normally limited to the summer months with the animals being moved to lower ranges, outside of the sub-biome, during the fall and winter.

Although most of the forest lands within the region are inside national forests, and are administered by the Forest Service, the BLM administers approximately 2.2 million acres of commercial forest (1.5 million acres available for timber production) on the public land within the region, from which $2,070,000 was received from sale of timber in 1974.* 89

Communities tend to be small, and are oriented to logging, ranching or mining which may occur in the area. A phenomenon that began after World War II and has increased alarmingly in some parts of the region having non-existent or weak local land-use controls has been the development of "speculative homesites." Frequently located in remote rural areas, these recreation sub-divisions have sometimes failed to develop as portrayed in the sales brochures.

Recreation-tourism is growing rapidly in importance throughout the sub-biome. In areas with outstanding resources such as the Yellowstone Park area or Aspen, Colorado, tourism is the mainstay for local communities. The Pacific Trail, routed along the crest of the Cascade Mountains stretching from Canada to Mexico, leads to points of scenic beauty accessible only by pack horse or foot and annually receives increased use. Throughout the Montane region federal, state, county, and municipal organizations as well as private enterprises have been active in the development of scenic and recreation resources, many of which lie adjacent to BLM forest lands. Hunting, fishing, sightseeing, picnicking, camping, hiking, backpacking and winter sports are the predominant types of recreation activities. Estimated recreation visitor days on public lands under BLM jurisdiction are presented in Table II-7.

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* Excluded from these figures are the O&C lands administered by the BLM in Jackson and Josephine Counties in Oregon. Although they are within the Montane Sub-biome, O&C land data pertaining to them are included with the other O&C counties under the Coastal Sub-biome section.

TABLE II - 7

Estimated Recreation Visitor Days On Public Lands Under The Jurisdiction Of The Bureau Of Land Management, 1974

State	Camping	Picnicking	Fishing	Hunting	Sightseeing	Water Sports	Winter Sports	Other	Total
Alaska	182,000	18,000	558,000	537,000	516,000	10,000	31,000	------	1,852,000
Arizona	1,358,000	285,000	2,000	228,000	1,353,000	1,000	------	405,000	3,632,000
California	5,452,000	308,000	357,000	1,642,000	4,181,000	95,000	52,000	5,885,000	17,972,000
Colorado	295,000	619,000	957,000	634,000	3,745,000	27,000	35,000	939,000	7,251,000
Idaho	236,000	92,000	2,933,000	174,000	130,000	74,000	38,000	25,000	3,702,000
Michigan	25,000	80,000	280,000	125,000	125,000	375,000	63,000	6,000	1,079,000
Minnesota	10,000	30,000	100,000	50,000	50,000	150,000	25,000	3,000	418,000
Montana[1]	370,000	76,000	243,000	227,000	238,000	49,000	29,000	20,000	1,252,000
Nevada	77,000	32,000	35,000	63,000	135,000	18,000	7,000	69,000	436,000
New Mexico	233,000	120,000	230,000	238,000	420,000	1,000	1,000	187,000	1,430,000
Oregon	1,166,000	582,000	900,000	616,000	1,211,000	130,000	58,000	686,000	5,349,000
Utah	186,000	158,000	62,000	265,000	925,000	130,000	18,000	136,000	1,880,000
Washington	5,000	3,000	28,000	21,000	13,000	4,000	3,000	7,000	84,000
Wisconsin	20,000	65,000	200,000	100,000	100,000	300,000	50,000	5,000	840,000
Wyoming	68,000	60,000	85,000	252,000	841,000	17,000	7,000	85,000	1,415,000
TOTAL	9,683,000	2,528,000	6,970,000	5,172,000	13,983,000	1,381,000	417,000	8,458,000	48,592,000

[1] Includes North Dakota and South Dakota Public Land Statistics 1974.

Although much of the Montane Coniferous Forest lies within the national forest system, the BLM has developed approximately 275 recreation sites containing more than 4,400 camping, picnicking and trailer units on the Bureau-administered public lands of the region.** There are additionally over 14,000 miles of stream and more than 500,000 acres of lakes and reservoirs on these public lands within and adjacent to the Montane Sub-biome available for fishing and other water-oriented recreation. [90] Additionally, most of the public land within this sub-biome is open to hunting. Collectively, recreation visits to the Bureau-administered public lands within and adjacent to the Montane Sub-biome were estimated at more than 60 million during 1971. [91]

2. Northwest Coastal Coniferous Forest

The history of early settlement of the Coastal Forest region followed essentially the same pattern as the Montane region to the east. Although rough and mountainous for the most part, the region contains some of the most productive softwood forests in the United States. Often referred to as the Douglas-fir Region for the principal tree species found there (except along the Alaska Coast), other valued softwoods are cedars, hemlock, spruce and true fir.

The gold rush and subsequent population growth in California afforded the first export market for the region's supply of mature timber. This market expanded into the developing Midwest with the extension of intercontinental railroads into the Pacific Northwest in the 1880's and 1890's. Production of wood products for a national market was the single most significant economic factor contributing to the rapid population growth of the region into the 1920's.

Lumbering and wood products industries continue to play an important role in the ecomony. In 1968 the Pacific Northwest Forest and Range Experiment Station estimated the degree of economic dependency upon timber industries of selected areas within the Douglas-fir Region of Washington, Oregon and California. Dependency was measured as a percent of total economic (or export) base employment attributable to timber-dependent industries. The researchers found that timber-dependent industries accounted for approximately 45 percent of the region's ecomonic base employment. Table II-8 shows timber-dependency ratings for 15 ecomonic areas within the region. [92]

** Figures are exclusive of the public land states of Nevada, Alaska and Oregon west of the Cascades which are outside the Montane Sub-biome. Also, not all of these recreation sites occur within the Montane Sub-biome but lie in adjacent biomes.

TABLE II - 8

CLASSIFICATION OF ECONOMIC AREAS BY DEGREE OF DEPENDENCY UPON TIMBER-BASED EMPLOYMENT

Dependency	Economic Area*	Percentage of 1960 excess employment dependent on timber-based employment
Slight	Seattle	6.2
	Portland	23.8
	Salem	29.3
Moderate	Bellingham	30.4
	Tacoma	32.5
	Astoria	63.1
High	Medford	70.0
	Corvallis	74.3
	Eugene	76.6
	Longview	81.5
	Aberdeen	88.1
	Eureka	89.6
	Port Angeles	90.5
	Coos Bay	91.6
	Roseburg	99.4

* Economic areas are identified by the names of their respective growth centers.

Note: The authors used the excess-employment technique to determine the portion of employment in an area which was engaged in economic base activities. This approach considers any industry in an area with employment in excess of the national norm for distribution of employment among industries to be producing for export. The percentage of total excess (export) employment (the total may include several industries, basic as well as service, for an area) attributable to timber related industries is computed and defined as the timber-dependency indicator (figures in the right-hand column of Table II-8).

The Northwest Coastal Sub-biome of western Oregon, Washington and northwestern California contains over 2.5 million acres of commercial forest lands administered by the Bureau of Land Management. The western Oregon lands, comprised of both the O&C and public domain, are generally recognized as one the nation's most productive and valuable commercial forest properties.* During fiscal year 1971 - 1975 approximately 6.0 billion board feet of timber worth $648 million were sold from the 1.9 million acres of commercial forest lands available for timber production located in western Oregon. In these fiscal years $223.8 million were distributed to the 18 O&C counties under terms of the O&C Act of 1937 and subsequent agreements (Table II-9). [93]

The O&C lands contribute 17.5 percent of the timber harvest in western Oregon. In this same area, timber-dependent industries account for 45 percent of the total economic base employment. This dependency ranges from a low of 24 percent in the Portland area to 99 percent in the Roseburg area (Table II-8). Thus, the O&C lands contribute approximately 8 percent of the total western Oregon ecomonic base employment. [94] The significance of these lands to local and regional economies is further exemplified by the fact that 17 percent (13,500) of the 78,000 persons employed in the lumber and wood products industry in western Oregon in 1965 could attribute their jobs to the O&C timber cut. Payrolls were $89.5 million and the value added to the economy, including the value of timber cut, was $187.1 million. This compares with the value of total products sold on farms of the 18 counties of $245 million. It is greater than the value added by any other Oregon industry, with the exception of the total lumber and wood products industry. [95]

These jobs in the basic industry in turn generated more than 20,000 other secondary employment jobs (retail, service, and other employees serving the basic employees), and supported a total population of about 80,000 (including the employees and their families). [96]

The Pacific Coast forms the western boundary of the Coastal Sub-biome. The proximity to the ocean adds to the recreational diversity of the area. Outdoor activities such as swimming, fishing and camping are some of the more common forms of recreation activity. Digging of clams, and crabbing, both commercially and as a form of recreation, occurs on the beaches and in the estuaries along the coast, reaching the peak of productivity along the Washington coast and in the Puget Sound area. Fishing in the numerous streams and rivers that traverse the coastal strip, many of which flow across BLM-administered lands (including the nationally known Rogue and Umpqua Rivers), yield exciting fresh-water catches. Saltwater sport-fishing has created and supports a growing charter boat industry.

* Although Jackson and Josephine Counties are within the Montane Forest Sub-biome, for purposes of clarity O&C data from them are lumped with the O&C counties in Coastal Sub-biome.

TABLE II - 9

WESTERN OREGON TIMBER SALES - VOLUME, VALUE, RECEIPTS AND O&C COUNTY PAYMENTS, 1971 - 1975

Year	Vol.[1] Sold (Bil. bd. ft.)	Value[1] Timber Sold (Million Dollars)	Timber[1] Sale[2] Receipts (Million Dollars)	[1] Payment of O&C Counties (Million Dollars)
1971	1.2	52.2	63.7	31.9
1972	1.2	66.2	75.3	37.7
1973	1.2	130.3	94.4	47.2
1974	1.2	213.2	115.6	57.8
1975	1.2	186.5	98.7	49.3
	6.0	648.4	447.7	223.9

[1] Values rounded

[2] Receipt distribution:

O&C Counties - 50%

Administration/General Fund (U.S. Treasury) - 25%

Appropriations for roads and improvements - 25%

Camping and picnicking are facilitated by the numerous county, state and federal parks located along the coast. Further inland, the BLM has developed and administers some 60 sites containing over 1,400 camping, picnicking and trailer units (Photo II-10). [97]

Most of the approximately 3 million acres of BLM administered land in the Coastal Sub-biome are available to the public for hunting. Since much of the area is covered by a dense forest, most of the hunting is concentrated in natural or man-made openings such as roads, timber harvest sites or cleared utility rights-of-way. Livestock grazing also occurs in localized areas on the lower, more open sites administered by the Bureau.

The cities of Seattle and Portland are the two principal metropolitan centers of the Coastal Sub-biome. The harbor facilities on Puget Sound make the neighboring cities of Seattle and Tacoma major centers of trade with foreign countries and provide a gateway to Alaska. Supported by the rich agricultural land around it, large accessible timber resources, and a more recent aerospace industry, the Seattle-Tacoma area has had a continuous development since the transcontinental rail lines made it a Pacific terminal.

Further south, at the confluence of the Columbia and Willamette Rivers, the City of Portland is an important trading center. Agricultural products from the rich Willamette Valley flow into, and through, the city while the Columbia Gorge provides easy access by rail, interstate highway and water to the Columbia Basin and Snake River Valley to the east. The flow of materials to and from foreign ports passing over the Portland docks mark the city as one of the major Pacific Coast ports. [98] Further south, on the coast, the deep water port of Coos Bay is developing into a major shipping point.

Low-cost hydroelectric power, deep-water ports, and availability of labor have encouraged industrial growth of the major urban areas.

To the north, along the southeastern Alaska coast, the cities of Sitka, Juneau and Valdez are the principal urban centers. For the most part, settlement of this segment of the Coastal Sub-biome is far behind that of the lower portion.

3. Taiga Coniferous Forest

Essentially uninhabited outside the Anchorage and Fairbanks urban areas, this region of central Alaska has a population density of only 0.5 persons per square mile. Scattered and remote, white and native settlements are located along major river valleys and the limited road systems. In percentage terms, Alaska's rate of growth has been rapid in the past decade with 33 percent increase in population between 1960 and 1970, for a total population of 300,000. Over half of these, 52 percent, live outside urban areas. [99]

PHOTO II-10: Picnic site. Bureau forest lands provide a variety of recreational opportunities, including hiking, camping and picnicking.

Native inhabitants of the Sub-biome are the Na-Dene Indian linguistic stock, who are highly dependent on fish and wildlife for their livelihood.[100] Summer employment, fighting the numerous Taiga wildfires, is a source of income to the men. Additional employment is available in the numerous small sawmills that operate part time in the interior to provide logs and lumber for local use.[101]

The lack of adequate road transportation in this area of Alaska has limited development largely to those areas that are reachable by the few existing roads. Air travel is used extensively throughout the interior. Consequently, much of the region remains wild, remote and inaccessible and represents one of the largest remaining contiguous wilderness areas in the world.

A primary land use in the Taiga is the harvesting of fish and game by the native people and, more recently, by white settlers and recreationists. Some limited use of the timber resource is made by both native and white inhabitants for housing and fuel. Many important river systems contribute anadromous fish to an international commercial fishery.

Mining has been the only other appreciable land use in the region--gold mining early in the century and, more recently, oil and gas exploration and development. Oil development on Alaska's North Slope and the Alyeska pipeline constructed across the Taiga will affect land use. The introduction of economic and human activity in the pipeline corridor is covered in depth in the U.S.D.I. Proposed Trans-Alaska Pipeline Final Environmental Impact Statement and other publications.[102]

The remoteness of interior Alaska, the lack of transportation facilities, the extremes in weather, and the sparsity of established communities present monumental obstacles to the development of interior Alaska's timber resources. Most of the better stands of timber occurring in the major river drainages are scattered over great distances and located in some regions where transportation is currently not feasible. The logistical problems and lack of economical transportation make interior timber non-competitive with more desirable species and sizes available in the coastal region of Alaska.[103]

A most significant land use of the Alaskan interior that can be expected to increase sharply in the future is outdoor recreation. Current estimates show 4.7 million acres of natural lakes and reservoirs, 244,000 miles of fishing streams, 218 million acres of big and small game habitat (containing 615,000 big game animals), and 65 million acres of waterfowl habitat located on the public lands, most of which are within the Taiga region.[104] Estimated recreation visits to the public lands within the region during 1974 exceeded 2.3 million.[105] In addition, the streams and lakes yielded an estimated 15.0 million pounds of commercial fish harvested in 1974.[106]

Many of the estuaries along the Alaskan coast provide important commercial, sport and subsistence fishing areas. The estuaries also provide important habitat requirements in the life cycle of anadromous fish as they move from fresh water streams and rivers to the open ocean.

Livestock grazing (cattle, horses, sheep, goats, and reindeer) took place on approximately 1.3 million acres of public land during 1973.[107]

Although the majority of the land within the Taiga is presently in public ownership, future jurisdiction will depend on relative resource values and the interaction of the Alaska Statehood Act (State selection of public land) and the Alaska Native Claims Settlement Act (PL 92-203).

Climatic extremes limit human habitation and land use. Severe winter temperatures, short summers, and wide occurrence of permafrost dictate a careful evaluation of all intensive future land use that may be proposed. 108

L. Aesthetics and Human Interest Values

In the case of historical and cultural sites, the National Register of Historic Places was not consulted since this statement covers some 24 million acres of commercial forest land. For the same reason, no other lists or inventories were consulted; and no cultural resource surveys were undertaken specifically for the purpose of preparing this statement. Consequently, the full extent of the number of sites on these lands is unknown, and those sites that have been identified are not listed because of their exceedingly high number.

1. Aesthetics

The Montane Coniferous Forest and, to a lesser degree, the Northwest Coastal Coniferous Forest, provide some of the most spectacular scenery in the western United States. Such natural attractions as Yellowstone Park, the Grand Canyon and numerous other lesser known sights located throughout the Montane region annually attract millions of sightseers. Further west, the coastal redwood forests of northern California and the rain forests of the Douglas-fir region of western Oregon and Washington offer a panorama of towering forest broken by occasional streams tumbling from the Coast Range Mountains to the Pacific Ocean. Less apparent from the ground, except in localized areas, man's intrusion into the coastal forest with roads, power transmission corridors and timber harvest activities creates harsh contrasts when viewed from the air.

Land forms vary from the rounded foothills of the Cascades and Coastal Range to the angular peaks of the Rockies, from relatively flat mesas and basins to nearly vertical canyons. Natural lines occur more often in the environment of the Montane than in either the Coastal or Taiga Sub-biomes. These may occur as abrupt changes in vegetation types caused by soil changes, avalanche paths or rock intrusions. They may occur as horizontal deposition lines on the face of an exposed cliff or cut bank.

Scale is frequently overpowering to those more accustomed to urban surroundings. The extreme vertical relief common to the mountains is frightening to some. To others the solitude of the mountains and the remoteness of the Taiga Coniferous Forest offer a welcome contrast. The wide variety of forms, textures, colors and natural lines are what make the scenic values interesting while vastness of scale and distance brings feelings of isolation and solitude to those who live within, or visit, this region.[109]

2. Geological Human Interest

The Montane contains geologically interesting features left by glaciation. Included are moraines; lakes; U-shaped valleys; erosion features like canyons; pinnacle peaks and mudflows; volcanic features such as lava flows, eroded ash beds, dikes, exposed plugs, calderas, hot springs and geysers.[110]

The Taiga also shows evidence of glacial action. Such structures as moraines, drumlins, glacial lakes, and other features occur along with features associated with permafrost and its actions, e.g., pingos, thaw lakes, and beaded drainages.[111]

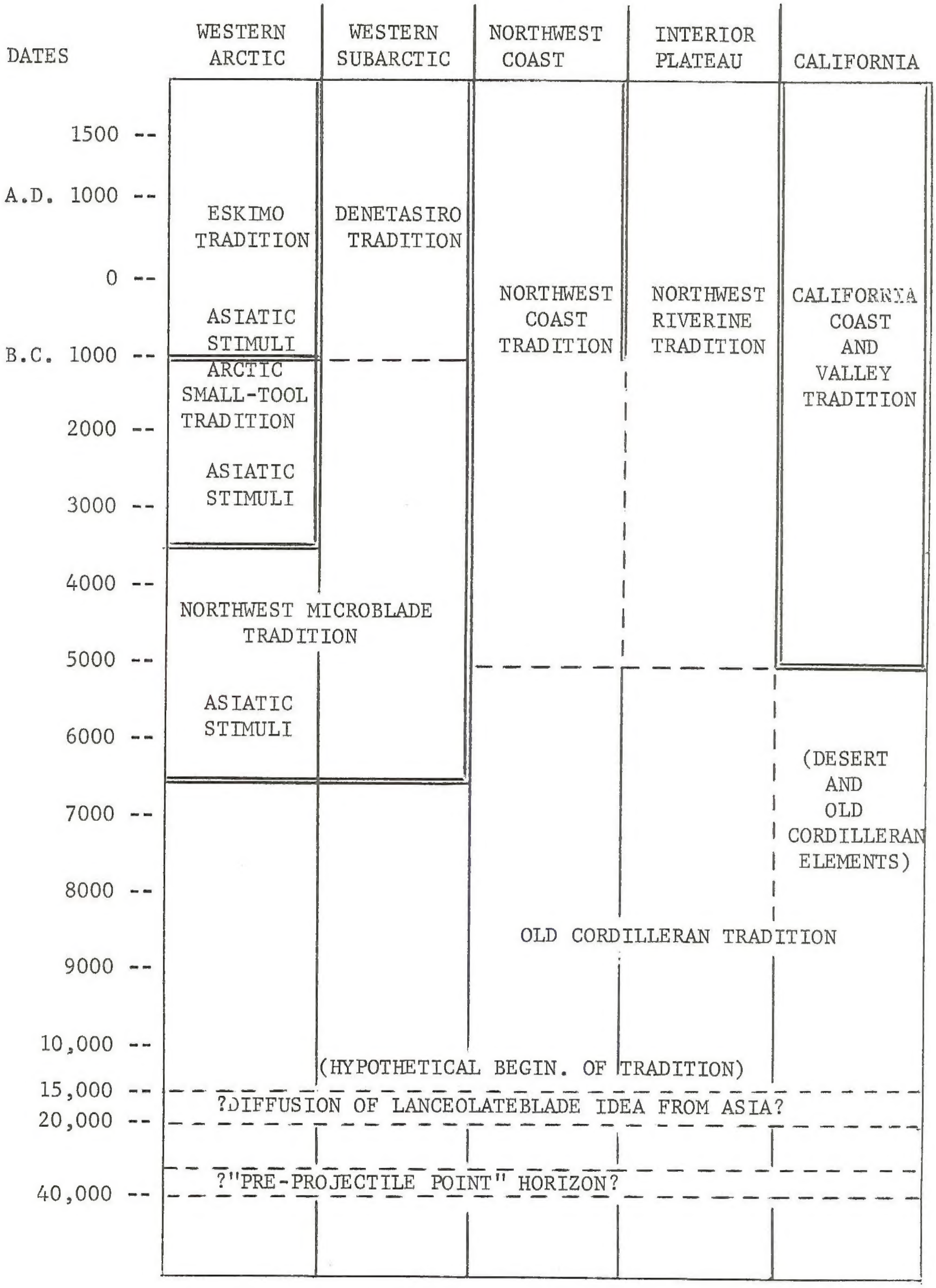
The Northwest Coastal is edged with an interesting eroded coastline of natural arches, isolated rock islands, sand dunes and steep cliffs. The higher elevations contain canyons, volcanic features, caves, and faulting evidence.[112]

3. Archeological Human Interest

Early man's entry into the New World from Asia via a Bering Strait land bridge, estimated to be 1000 miles wide when the seas were at their lowest, is believed to have occurred between 20 and 40 thousand years ago. Radiocarbon-dated remains going back to about 10,000 B.C. show well-developed, stone-chipping techniques and hunting skills adapted to the taking of large animals. Most evidence comes from game-kill sites and stratified cave deposits.[113] Figure II-18 schematically depicts the major cultural traditions found in the Coniferous Forest Biome.

SCHEMATIC DIAGRAM OF THE MAJOR CULTURAL TRADITIONS OF NORTH AND MIDDLE AMERICA VIEWED DIACHRONICALLY.

FIGURE II-18


DATES
WESTERN ARCTIC
WESTERN SUBARCTIC
NORTHWEST COAST
INTERIOR PLATEAU
CALIFORNIA
1500 --
A.D. 1000 --
0 --
B.C. 1000 --
2000 --
3000 --
4000 --
5000 --
6000 --
7000 --
8000 --
9000 --
10,000 --
15,000 --
20,000 --
40,000 --
ESKIMO TRADITION
DENETASIRO TRADITION
ASIATIC STIMULI
ARCTIC SMALL-TOOL TRADITION
ASIATIC STIMULI
NORTHWEST COAST TRADITION
NORTHWEST RIVERINE TRADITION
CALIFORNIA COAST AND VALLEY TRADITION
NORTHWEST MICROBLADE TRADITION
ASIATIC STIMULI
(DESERT AND OLD CORDILLERAN ELEMENTS)
OLD CORDILLERAN TRADITION
(HYPOTHETICAL BEGIN. OF TRADITION)
?DIFFUSION OF LANCEOLATEBLADE IDEA FROM ASIA?
?"PRE-PROJECTILE POINT" HORIZON?

(Source: Gordon Willey, An Introduction to American Archeology, Prentice-Hall, 1966)

The Montane Forest was utilized for food gathering and hunting by the Plains culture and Desert culture that developed in the trans-Rocky Mountain west.

In the Taiga, the Old Bering Sea culture developed into the early stages of Eskimo culture based on the hunting of sea animals.[114] Further inland in the Alaskan interior, the sub-Arctic culture, based on the Old Cordilleran and Big Game Hunting traditions, developed into the Northwest Microblade tradition of people who lived by hunting caribou, elk, buffalo and by fishing. The Microblade tradition is felt to have provided the core for the Denetasino tradition which became the culture of Athabascan-speaking Indians. Archeological sites are mostly campsites along streams and lakes and on ridgetops with occasional rock shelters.

The Northwest Coastal Coniferous Forest was the home of the Northwest Coast culture. Essentially a river or river-mouth culture oriented around salmon fishing, the Northwest Coast culture is noteworthy for its vigorous and distinctive art and great use of wood. Village sites were located along streams and near sheltered inlets along the coast and consisted of both pit and surface houses. Occasional rock shelters and some campsites away from the streams are also found.[115]

4. Historical Human Interest

The Montane shares its history with that of the nearby grasslands and desert. Many of the early settlements started as mushrooming mining camps that later blossomed into the present day cities of Baker, Lewiston, Boise and Helena.[116] Most of the early mining camps became empty shells as the ore petered out and their inhabitants moved on to greener pastures. Some of these "ghost towns," such as Montana's Virginia City, have survived the ravages of time and today are popular tourist attractions. Other early settlements grew up around military forts and trading posts located along exploration and immigration routes to the West. Today, many of these early sites have been given national designations as historical sites and monuments.

The early history of the Northwest Coastal developed around fur trading, lumbering, and to a lesser degree, mining. Spain, England, Russia and the United States all laid claim to this region through discovery, exploration, and occupation. One of the earliest white settlements was Astoria, Oregon, established as a fur-trading post by John Jacob Astor's Pacific Fur Company. This company was later sold to the Hudson's Bay Company which relocated the headquarters a hundred miles up the Columbia River from Astoria and established Fort Vancouver, Washington which currently is designated as a national historic site.[117]

Approximately 20 years following the establishment of Fort Vancouver, the few American settlers in the Oregon country, tired of living under British laws and the authority of the Hudson's Bay Company, met at Champoeg, near Newberg, and voted to establish a provisional government until Congress would extend jurisdication over them. This was the first American government to be established west of Iowa. Today Champoeg is a state park. [118]

Scattered throughout the Coastal Forest are remainders of the region's early history. Old mining and logging camps, remnants of military posts, and preserved homes of early pioneers are some examples.

The Taiga of Alaska was initally claimed and explored by Russia. Early trading posts and missions (some still in use) were established during the period of exploration. After purchase by the United States, the area experienced a gold rush which created numerous "boom and bust" settlements, of which the relics of many still exist. Many of the present native settlements occupy sites that were established hundreds of years ago. Some remain little changed from primitive times. [119]

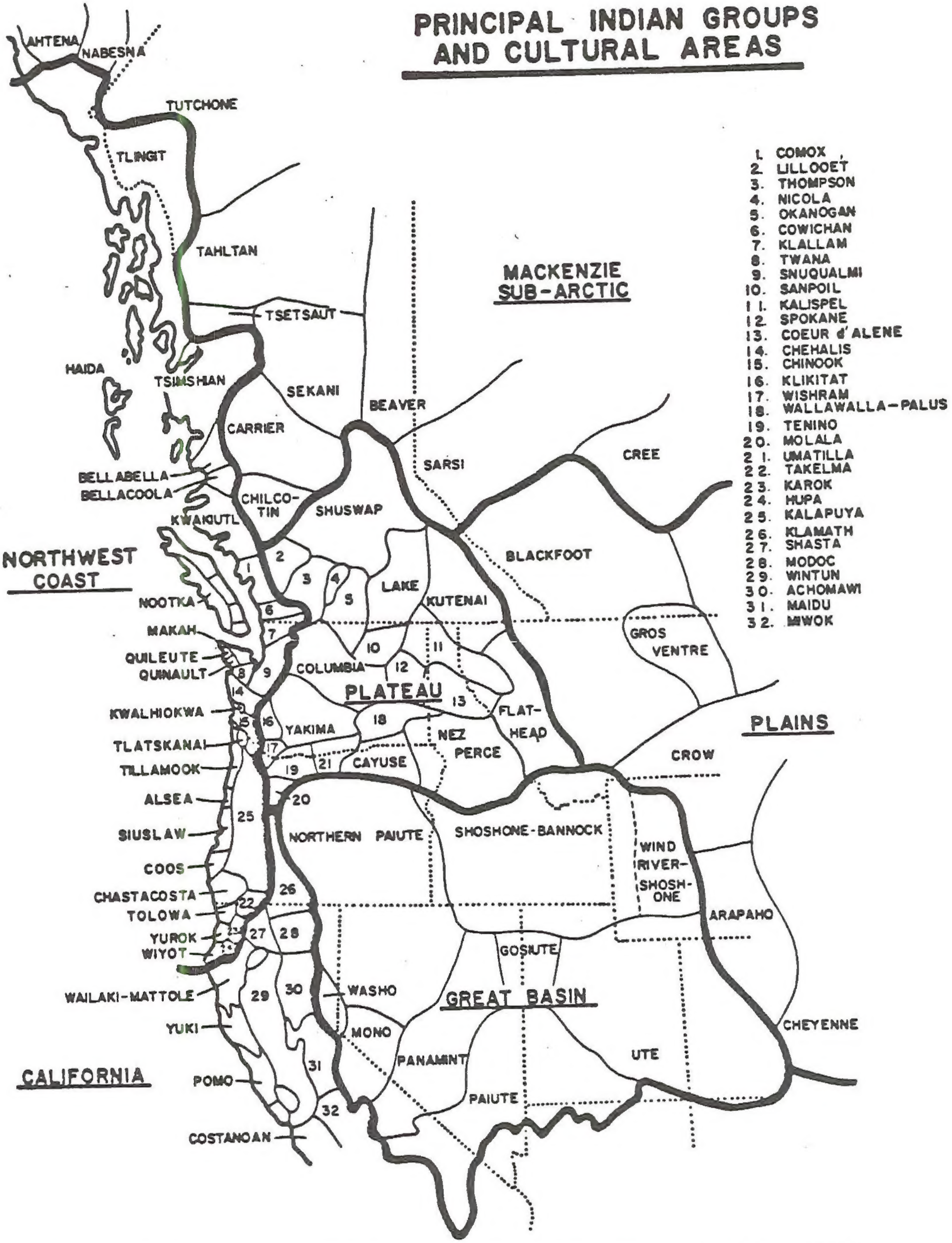
5. Ethnic Values

Numerous Indian groups currently make their homes in various locations scattered throughout or nearby the Montane Forest. Most of these groups reside on the following reservations which extend into the Montane Forest: Colville, Yakima, Coeur d'Alene, Nez Perce, Flathead, Warm Springs, Crow and portions of the Navajo, Uintah and Ouray, Pueblo, Fort Apache and Tule River Indian Reservations. Figure II-19 graphically displays the distribution of principle indian groups and cultural areas in northwestern North America. Many of these groups derive part of their economic and spiritual sustenance from the Coniferous Forest. [120]

The Taiga Forest of Alaska contains one of the largest remaining native American groups still living in much the same way as they have since contact times. They depend to a large extent upon the Taiga for their livelihood.

The Northwest Coastal Forest contains several Indian reservations, among them the Makan, Ozette, Quillayute, Hoh and Quinalt Reservations in Washington and the Hoopa Valley Reservation in California (Figure II-19). Inhabitants rely to some degree on the Coastal Forest for their livelihood. [121]

FIGURE II-19



PRINCIPAL INDIAN GROUPS AND CULTURAL AREAS

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106. See 89 above, Table 54.

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112. See 102 above, pg. 154.

113. See 24 above, pg. 129.

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III. ENVIRONMENTAL IMPACTS OF TIMBER MANAGEMENT

This chapter excludes mitigative measures in describing adverse and beneficial impacts. The reason for this is to provide the public, as well as the Bureau, a benchmark for analysis and a perspective of the potential impacts any one action might cause. The unmitigated impacts of all practices are discussed regardless of whether they are included in the program for a particular sub-biome as their potential for application sometime in the future does exist. Any variations in the impacts between sub-biomes will be identified accordingly.

The reader should also keep in mind that the unmitigated impacts identified and discussed in this chapter are on a programwide basis. Impacts, on a local, regional or site-specific basis may vary considerably from that identified in this chapter, i.e., impact on water quality programwide may be minor; but on a specific stream, river or lake, it could be major.

To assist the reader in correlating the impacts of the practices planned during the decade with their geographic location and magnitude, Table III-1 sets forth the practices or causes of impacts and the acreage to be affected on an annual and decadal basis. Chapter I (E) provides a detailed description of each practice. The data in Table III-1, relating to logging system acreages, are approximations. Generally, western Oregon is located within the Northwest Coastal Forest Sub-biome, interior Alaska within the Taiga Sub-biome, and the remaining western forests within the Montane Forest Sub-biome.

A. Ecological Interrelationships. The nature of many chain-like relationships in the cycles and flows that link the components of the ecosystem is not known or understood. It can be assumed that impacts on one part of the ecosystem will affect the whole; however, the manner and magnitude in which the total ecosystem is affected is often unknown or vague. Some information does exist, however, for impacts of specific practices for particular locations on parts of the ecosystem. Such impacts may be indicative of the effects of the same or similar practices conducted in other locations.

While atypical of timber management practices, an experiment in New Hampshire in 1965 involving the cutting of all vegetation, leaving the debris, and then chemically killing all resprouting vegetation for 3 years reduced the nutrient capital of a forest ecosystem: (1) by increasing the amount of water passing through the system, (2) by reducing root surfaces able to remove nutrients from the leaching waters, (3) by the removal of nutrients in wood products, (4) by adding to the organic matter available for immediate mineralization, and (5) in some instances by producing a microclimate more favorable to rapid mineralization.[1] Later results from the study indicate that, as soon as the chemical treatments were stopped, nutrient losses returned rapidly to their former state.

TABLE III-1

TIMBER MANAGEMENT PRACTICES TO BE CARRIED OUT BY GEOGRAPHIC AREA
(Acres Affected Per Year/Decade Except As Otherwise Noted)

	Western Oregon		Alaska	Remaining Forests	
Development Practices	Acres/Yr.	Acres/Decade	Acres/Yr. 10/	Acres/Yr.	Acres/Decade
Tree Improvement	24,000 1/	240,000	0	0	0
Scarification	700	7,000	0	300	3,000
Mechanical Brush Cutting	0	0	0	> 100	> 1,000
Mechanical Trenching-Furrowing	0	0	0	0	0
Burning	9,000	90,000	0	> 100	> 1,000
Burying	> 100	> 1,000	0	> 100	> 1,000
Chipping	0	0	0	0	0
Seeding	300	3,000	0	50	500
Planting	23,000	230,000	0	2,400	24,000
Chemical Weed Control	5,000	50,000	0	100	1,000
Baiting	200 2/	2,000	0	1,000 9/	10,000
Fencing and Screening	0	0	0	0	0
Mulching	> 100	> 1,000	0	> 100	> 1,000
Snag Felling	0	0	0	0	0
Fertilization	1,500 3/	15,000	0	0	0
Precommercial Thinning	10,000	100,000	0	600	6,000
Pruning	0	0	0	0	0
Stand Conversion	370	3,700	0	0	0
Brush-Hardwood Control	20,000	200,000	0	0	0
Shading of Planted Seedling	400	4,000	0	0	0
Animal Damage Protection of Seedlings	150	1,500	0	0	0
Protection Practices					
Fire Control	--------------------Total of		275,000/yr.	(2,750,000/decade) 4/-------	
Insect Control	5/		0	5/	
Disease Control	5/		0	5/	
Harvesting Practices					
Commercial Thinning	2,400	24,000	0	500	5,000
Clearcutting	19,000	190,000	0	800	8,000
Partial Cutting (Includes Shelterwood, Seed Tree and Selection)	30,000	300,000	0	40,000 6/	400,000
Mortality Salvage	5,500	55,000	0	0	0
Tractor Logging	32,000 7/	320,000	0	28,500 7/	285,000
High-Lead Logging	16,000 7/	160,000	0	4,500 7/	45,000
Mobile Yarder Logging	6,000 7/	60,000	0	7,000 7/	70,000
Aerial Systems	3,000 8/	30,000	0	800 8/	8,000
Road Construction (Miles)	400	4,000	0	100	1,000
Road Maintenance (Miles)	5,000	50,000	0	500	5,000

1/ Annual acres to be planted with genetically improved stock during 1980-83.
2/ Projects for Fiscal Year 1975 only. None planned for FY '76 and '77.
3/ Operational test for Fiscal Year 1975. None planned for FY '76 and '77.
4/ Based on historical average 1969-73. Approximately 95% of the 275,000 acres burned will be in interior Alaska.
5/ Carried out through normal cutting practices.
6/ Shelterwood cutting is predominate practice.
7/ Acres will not be constant, but will decrease from year-to-year with increased use of aerial systems.
8/ Will increase from year-to-year.
9/ Acres will not be constant, but will vary from year-to-year.
10/ An undetermined amount of timber volume may be needed to fill local, domestic-use requirements and for oil exploration/pipeline construction purposes. These demands, however, are speculative and any such disposal will require environmental assessments.

A more typical example of timber management practices was a study made in western Oregon in the 1960's which examined the impact of scattered clearcuts (with streamside buffer strips) in one drainage and a large clearcut extending across a stream in another drainage. No changes were observed in the nitrate nitrogen, potassium, and phosphorous content of stream water in the scattered clearcut drainage. A four-fold increase in nitrate nitrogen loss did occur in the large clearcut following logging and burning. The study concluded that this amount of loss posed no threat to forest soil productivity since the soil contained high nitrogen capital and that rapid revegetation limited future nutrient loss by quickly reestablishing the cycling process. However, the study also concluded that the microorganism and cutthroat trout populations of the stream in the large clearcut drainage were adversely affected, thereby, disrupting the ecological interrelationships of the aquatic ecosystem[2].

Using results from these and other studies must be interpreted with respect to the practices to be employed and the specific conditions that characterize the impacted area. These specifics include soil, topography, climate, vegetation, the design of the cutting area(s) and the method of logging. It may be safely assumed, however, that the application of any timber management practice which completely destroys terrestrial, riparian and aquatic vegetation will have a severe, short-term impact on the ecological interrelationships of the impacted area since the principal component of the ecosystem upon which all other members of the biotic community depend has been removed. Any resulting reductions in the population densities due to mortality or relocation may only be temporary; nonetheless, the ecological interrelationships of the impacted area and possibly offsite areas are disrupted. The removal of streamside vegetation, channel alteration and stream degradation, for example, can have a long-term, severe impact on specific species of anadromous fish by depleting a series of year classes of the fish population. The impact on a specific run of fish will depend upon the importance of the stream habitat impacted by the action. If the ecological interrelationships in adjacent, undisturbed areas are in delicate balance, the relocation of such animals as deer, elk, etc. may further extend the impact of the action. Therefore, the severity of the short-term impact is not always localized to the directly affected area but is dependent on the capacity of adjacent areas to absorb increased animal populations. This in turn is partly a function of the nature and magnitude of the action itself.

While the physical impact of timber management practices on vegetation is readily visible, impacts on the soil microorganisms that act as decomposers are indiscernible and perhaps more subtle. Nonetheless, these organisms constitute a vital link in the trophic hierarchy, and their elimination or reduction caused by chemicals or severe soil disturbance can result in significant, adverse, short-term impacts on the ecosystem.

The long-term ecological impact of most timber management practices is primarily dependent upon the rate of recovery of the area affected. Generally, communities with high productivity in terms of the vegetal biomass can recover relatively rapidly. Communities with low productivity, i.e., plant communities with low growth rates and animals with low production rates, are generally fragile and slow to recover.[3] Consequently, the long-term impacts of the development, protection, harvest and transportation practices that remove vegetation and/or cause extensive surface disturbance can be particularly severe in the Taiga Forest and the sub-alpine and alpine zones of the Montane Forest. Other localized areas within the Montane, and also in the Northwest Coastal, are fragile and highly vulnerable ecologically if disturbed.

Regardless of the sub-biome, harvesting practices conducted in overmature stands will diminish the extensiveness of the old-growth ecosystem with its unique biotic community, either immediately as in the case of clearcutting or over time in the case of other final harvest practices. While opportunities do exist for the relocation of some members of the biotic community, certain species will not be mobile or adaptable, resulting in population reductions for these species. Some species could have populations decreased to the extent that they would be added to the threatened or endangered category.

Relative to the potential impact on the biotic components of the ecosystem, the impact of timber management practices on the atmospheric components of the physical environment are considerably less. Although burning practices do release some chemical toxicants into the air, their impact is minimal in terms of human health; and they appear to have no impact on the ecological relationships within the forest environment. Prescribed burning may have positive impacts on certain wildlife forms that prefer subclimax forms of vegetation which become established following a burn.

Even though the impact of any one practice on any one area is severe, its significance may be diluted when viewed in the context of the size of the impacted area in relation to the size of the surrounding geographic area. Nonetheless, many practices are conducted in different parts of the forest at the same time and in total can cause a severe, cumulative impact to the ecosystem of the general area. In conjunction with this, timber management actions on adjacent federal, state or private lands will contribute to the cumulative impact of timber management practices within a given drainage or area. Over a period of time, individual practices (including those having little adverse impact), when continuous, can have a significant, cumulative, adverse impact on the ecosystem. Impacts of the major timber management activities are summarized in Table III-2 (Chapter III, L).

B. Impacts on Physiography, Geology and Minerals

These impacts can be divided into those actions which affect (1) the minerals, and (2) the landforms or topography. In general, timber management practices have little or no impact on minerals; therefore, this subject of minor significance will not be pursued further. The impact of timber management on minerals development is discussed in Chapter III (I)(2). Certain timber management practices do, however, affect the landform or topography by increasing the weathering potential and rate of erosion, thus, increasing the likelihood of landslides including rock creep, soil creep, solifluction, earth flows, mud flows, sheet wash, and other related phenomena. Three principal factors cause these landslide phenomena: (1) the topography, (2) the geologic structure, and (3) soil characteristics. In short, any geological structure or soil rock condition which permits complete saturation by ground water to lubricate the mass and reduce internal friction to a minimum favors landslide development.

Forest Development

Scarification, mechanical brush cutting, trenching and furrowing and area burning increases soil erosion, especially during the wet season by exposing the surface to the effects of raindrop splash, gullying, and headward erosion. Saturation of the soil and the underlying rocks would result in landsliding if the geologic structure and rock types are conducive to sliding. Scarification and area burning are the most common of these practices and will impact approximately 10,000 acres annually or 100,000 acres during the decade (Table III-1), over 95 percent of which will be attributable to the western Oregon forestry program. The effects of spot burning are similar to area burning but to a lesser degree because a smaller part of the surface is exposed to weathering. Burying slash increases the porosity and permeability of the ground surface exposing it to the effects of moisture during the wet season. Localized wet spots can develop, and slumping might occur on oversteepened slopes. Chipping, lopping and leaving and lopping and scattering provide a surface cover of litter which reduces the impact of raindrop splash, thus, reducing its erosive potential.

Hand clearing and cleaning will have no significant impact on physiography, geology or minerals. Chemical control measures remove vegetation that provide surface cover and hold the soil blanket together and, unless replaced by another more desirable plant, would have the effect of increasing erosion. Snag felling, precommercial thinning and pruning have little or no effect on erosive processes.

Protection

Fire lines constructed by tractors expose the surface to erosion and are particularly harmful in the Taiga Forest. Sidecasting increases the potential for mass wasting when material is deposited in drainages or along steep slopes. Back firing has the same impact as burning, described previously.

Cutting Practices

Those practices such as clearcutting and seed tree cutting which remove a higher percentage of the forest cover increase the erosion potential by exposing the surface to the effects of moisture. Steep slopes which have soils, rock types, and geological structure conducive to slope failure when saturated by moisture are more prone to landslide and relating penomena when the herbaceous cover is removed. In western Oregon, for example, clearcutting on steep slopes (92 percent plus) with shallow soils (less than 20" deep) underlain by Tyee Sandstone will often result in slope failure and landslides. Slope failure on these sites generally occurs from 1-5 years following harvesting and is related to soil moisture and the decomposition of the root system which anchors the soil in place. Physiographic impacts of such failure are permanent and may involve up to 15 suface acres and a quarter of a million tons of debris.

Logging Methods

Ground logging systems may have an adverse impact, the magnitude of which is dependent upon the soil characteristics, topography, rock types, geologic structure, climate, season of operation and the type of equipment used. Erosion (in the form of raindrop splash, gullying and headward erosion) increases when the surface layer of soil and forest litter is disturbed along with the removal of the foliage canopy. Sidecasting and landing construction on steep slopes or in drainages initiates sliding if the materials become saturated. The unmitigated impacts of logging methods upon the surface are a forerunner to the impacts which might occur due to the geologic situation and are discussed under Soils.

Transportation

The impacts of road construction on slopes can be divided into two categories: (1) those problems associated with slopes in soils and (2) those associated with slopes in rocks. The basic factors affecting slopes in soil or rock are similar although rock strengths are of greater magnitude than soil strengths. In general, the strength of large masses of soil depends upon cohesion and resistance to tensile and shear stress; the strength of large masses of rock depends upon the strength of the rock and the defects such as faults, fractures, or joints that intersect the rock.

The stability of a soil or rock slope is presumed to be a function of the slope height, slope angle, the size of the excavation and the stresses imposed on the soil or rock by tectonic and/or gravity forces, earthquakes, or other static or dynamic forces. Also, slopes are affected by static and dynamic water pressures in the pores of soils or permeable rocks. These are all natural forces affecting slope stability.

The introduction of man and his construction of roads and other excavations upset this balance in the stability of many slopes (Photo III-1). Clearing the vegetative cover exposes 3,000 to 4,000 acres annually (30-40 thousand acres during decade) to erosion and the effects of moisture. Approximately 80 percent of the exposes area will be in western Oregon. Excavation removes former support. Filling and embankments often oversteepen slopes and increase the slide potential. Drainage patterns can be upset and increase the erosive potential. The impacts of maintenance practices are negligible.

C. Impacts on Soils

Forest Development

Scarification of approximately 1,000 acres annually disturbs the protective layer of litter and churns up the topsoil, thereby, exposing it to raindrop splash, erosion and subsequent soil creep. Compaction of the soil which reduces productivity will result if scarification is done during periods of soil wetness. Mechanical brush cutting of less than 100 acres annually will result in soil compaction from the equipment when the soils are wet; however, the cut brush will add to the soil cover and hasten the natural nutrient cycling in the soil. Mechanical trenching-furrowing will expose the soil and act as a road for erosion, mass wasting, and loss of productivity. Area burning of approximately 9,000 acres annually (90,000 acres in program period) will cause a loss in plant nutrients from the soil since nitrogen, sulphur, and about 30 percent of the phosphorous are lost during burning. Burning of the organic matter also creates a non-wettable soil surface condition especially under dry conditions on coarse-textured soils and causes surface water runoff, hence erosion. Spot burning intensifies the conditions outlined under area burning, sometimes to the point of soil sterility which lasts for a number of years. Where permafrost exists, it could melt and initiate a new sequence of erosion. Burying slash on approximately 200 acres annually causes soils to be exposed to erosive agents when the litter is removed. The wasted soil will also ravel or creep downhill if slope gradients in excess of 30 to 45 percent are involved. Chipping, lopping and leaving, and lopping and scattering slash will provide a protective litter cover for the soil surface; chips spread over the surface will also cause a temporary reduction in soil nitrogen.[4] Chipper and related equipment will cause soil compaction. Hand clearing and cleaning will have no significant impact on soils. Seeding and planting of approximately 25,700 acres annually will protect the soils from erosion. Mulching of less than 200 acres annually will protect the soil from erosion but may suppress natural growth which otherwise provides a natural watershed cover. Fertilization of 1,500 acres in fiscal year 1975 will promote additional vegetative growth which in turn will provide better cover against soil erosion. Any fuel or chemical spill could cause temporary soil sterility during precommercial thinning operations.

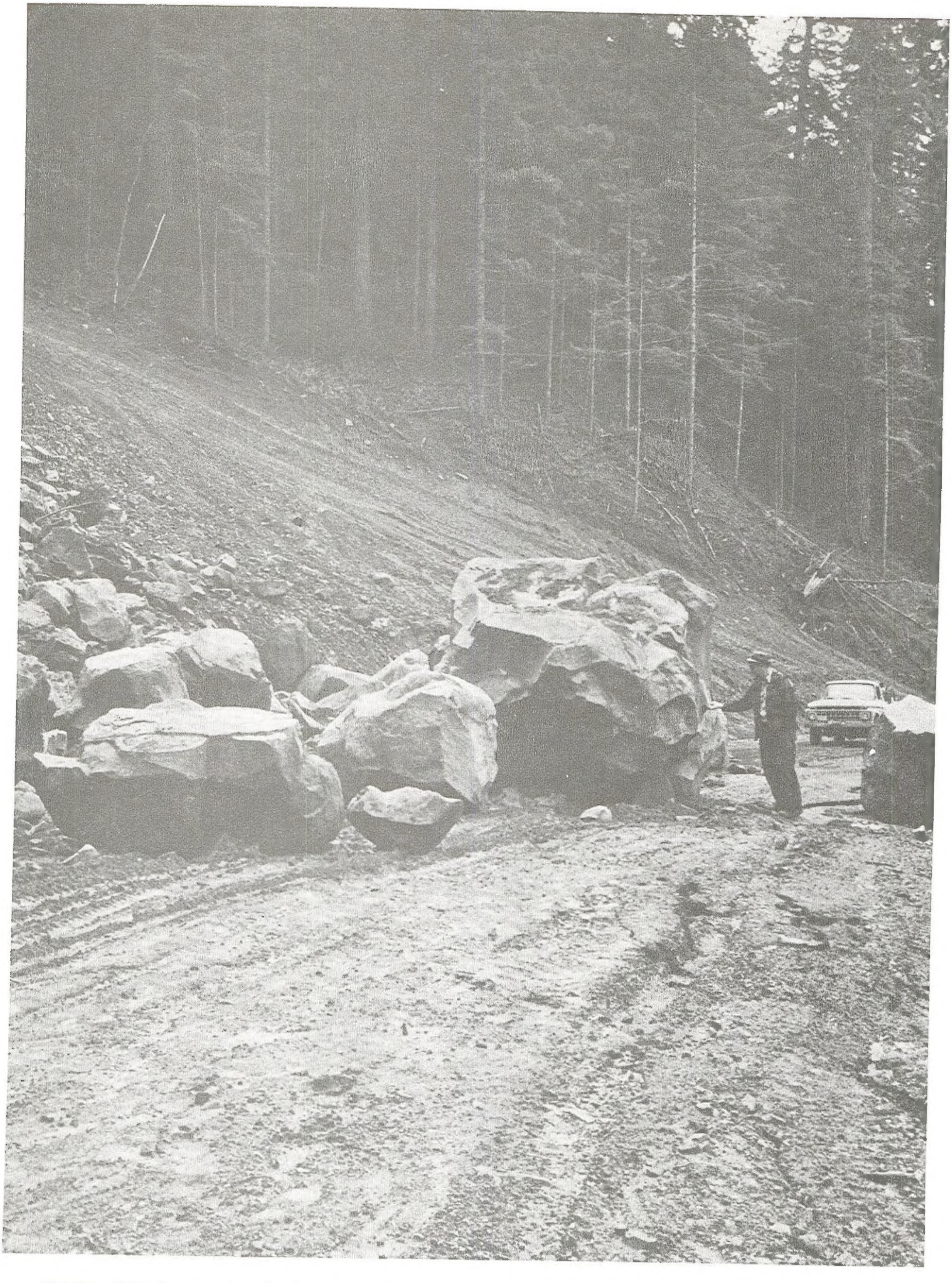

PHOTO III-1: Rock slide caused by road construction.

Protection

The use of insecticides and fungicides can cause an imbalance of the soils macro-fauna and fungi for an unknown period of time; however, the full range of this shift in balance is not known. The degree of the shift would depend upon the toxicity, quantity of chemical applied, the depth of penetration and the length of time necessary for decomposition. These factors are quite variable depending upon rate of application, types of chemicals used, and climate. The use of retardants to suppress fires is not detrimental. Tractor-constructured fire lines expose the soil to erosive forces and, where lines run perpendicular to the slope, serious erosion may result. Tractor-constructured fire lines are particularly harmful in the Taiga Forest. Materials sidecast into draws can increase the potential for mass wasting. The impact of back-firing is similar to area burning (described under Development).

Cutting Practices

Clearcutting on approximately 20,000 acres annually will expose the soil to erosive forces, particularly water, and increase the potential for landslides on non-cohesive soils. Since most of the vegetative cover is left intact on the 89,000 acres annually subjected to precommercial and commercial thinning, shelterwood and selection cutting and mortality salvage, minimal soil exposure will result from these practices. The effects of cutting practices on soils are shown in Table III-2 (Chapter, III, L) by type and magnitude of impact.

Logging Systems

The unmitigated effects of logging operations upon the soil are interrelated functions of different types of soils, equipment, weather, and topography. For example, soil may be severely damaged by crawler tractor logging on approximately 60,000 acres annually during times of soil wetness, but the same soils may not be harmed if the same operation is conducted when the soil is frozen or protected by snow cover. The hazard for soil sterilization in small areas caused by fuel or oil emissions or spills is always present when motorized equipment is employed. The impact of logging systems on soils are discussed as follows and are summarized in Table III-2, Chapter III,L.

Logging systems with the least impact upon the soil are standing skyline, running skyline, slackline, balloon, and helicopter yarding since they require the least amount of roads and trails and cause the least amount of litter and soil disturbance during yarding. These methods are currently being applied to approximately 3,000 acres in western Oregon and 800 acres in the remaining contiguous states. Combined, this represents only 4 percent of the total area harvested annually; however, use is likely to increase in the years ahead. Road and landing construction can initiate soil erosion and sometimes landslides.

Logging systems with a moderate impact upon the soil are horse skidding, high-lead yarding, and mobile yarder-loader operations. These methods require more roads and landings than methods listed above and also disturb a larger percentage of the litter and topsoil. Additionally, skid trails become scraped and compacted. These two conditions concentrate water and provide areas for overland flow of water causing rill and gully erosion. Horse skidding, high-lead yarding and mobile yarder-loader operations are currently used on about 22,000 acres in western Oregon and about 12,000 acres in the remaining contiguous states annually. As aerial logging operations increase in the future, these figures will decline significantly.

Logging systems which have a severe impact upon the soil are the crawler tractor, rubber tired skidder and jammer. These methods are currently being employed on approximately 32,000 acres (320,000 acres in decade) in western Oregon and 28,000 acres (280,000 acres in decade) in the remaining contiguous states although jammer yarding is becoming obsolete. Increasing use of the more flexible running skyline and slackline systems will eventually reduce these acreages significantly. Tractor logging disturbs and compacts as much as 40 percent of the harvested area. Program-wide, this represents 15,000 acres annually or 150,000 acres during the decade on which severe disturbance and compaction will (under certain conditions) occur. Of these totals, approximately 50 percent will occur in western Oregon. The main skid roads receive the severest damage and occupy about 20 percent of the area yarded (Photo III-2). Soil structure is usually destroyed on frequently traversed areas and is more easily destroyed if the soils are wet. Increased surface runoff usually occurs under these conditions. In comparison, tractor logging causes deep soil disturbance over 15 percent of the area yarded while moving-cable logging causes only 2 percent. Jammer yarding requires a dense road network and results in more area being exposed to erosive forces than any other logging method. Logging methods that disturb the surface serve a useful purpose by removing layers of organic material and exposing mineral soil for seed germination.

Transportation [4-7]

Road construction of 500 miles annual will require the initial removal of vegetation from approximately 3,000 - 4,000 surface acres. Of this amount, 75 percent will occur in western Oregon. The impacts of road construction on soils are summarized in Table III-2, (Chapter III,L).

Generally, road construction has the greatest impact on soils of all timber management practices. Construction operations create erosion and sedimentation problems during the land clearing, shaping, and stabilization of the new soil surface. The released sediment may have a lasting effect on the shape of a stream channel and impacts the downstream environment. The impact of construction operations upon

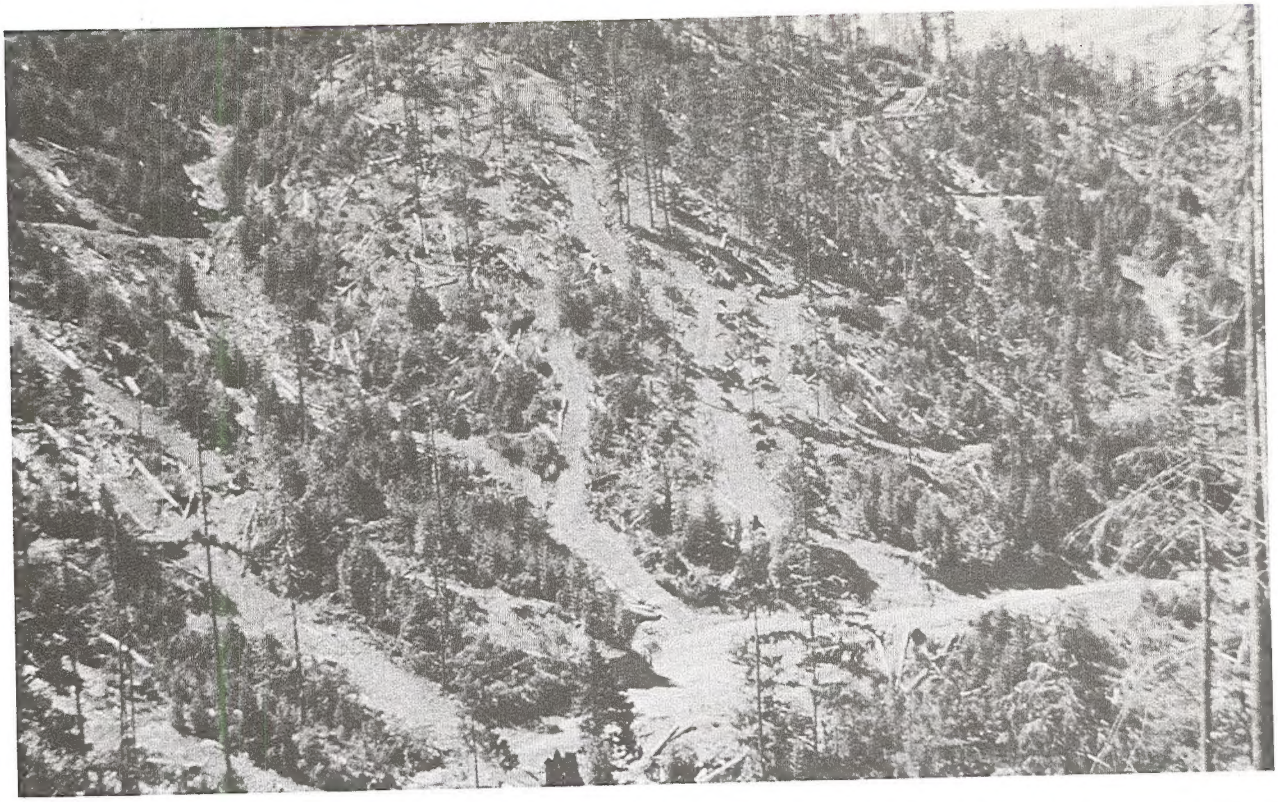

PHOTO III-2: Improper tractor logging causes excessive skid trails and, thus, leads to accelerated soil erosion and sedimentation.

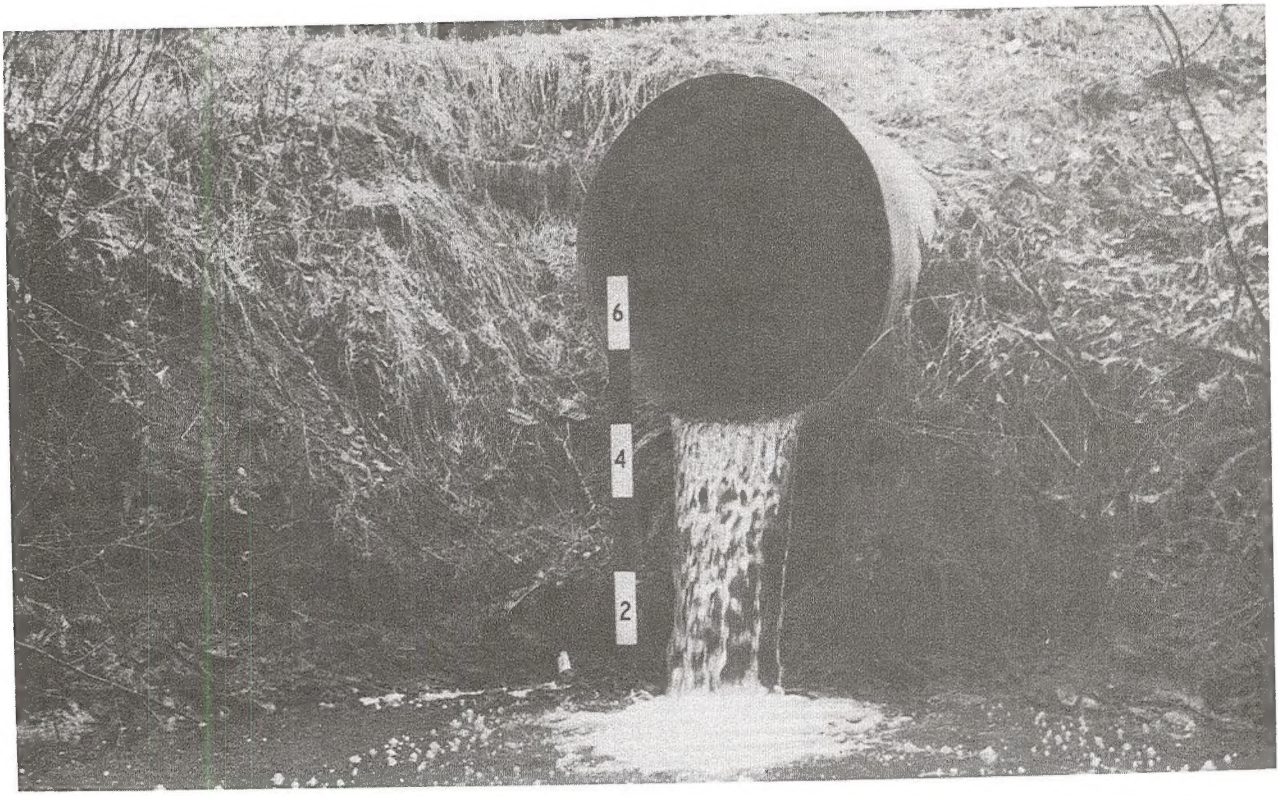

PHOTO III-3: Scour holes are created at the outlet end when culverts are improperly installed.

the soil are interrelated functions of different types of soils, equipment, weather, and topography. Clearing and grubbing exposes the soil to erosive elements. The excavation of earth or rock from its natural resting place will cause several impacts on the soil resource by: (1) altering the natural drainage from hillsides and exposing underlying soils to weathering action, (2) removing lateral support for adjacent material, and (3) possibly unloading a slope at a critical point thus triggering landslides. Blasting of rock compacts, shakes and fractures the soil resource which often results in erosion. Embankments, consisting of man-made deposits of soil, may affect the soil resource through a combination of equipment and soil placement operations, particularly during wet weather. Fills add weight to the underlying soil mass which on steep hillsides will often trigger landslides or slip failure. Added weight of fills on faulty foundations can result in slumps and settlements. Newly constructed fills having an angle greater than the normal angle of repose are prone to failure and, thus, will contribute to erosion and sedimentation until stablized. Grading operations impact soil by cutting, smoothing and disturbing surface materials on road surfaces. Fill slopes, cut slopes, ditches and other areas also require shaping. Wet weather during these operations will cause erosion and sedimentation.

Seeding and mulching equipment used in stabilization efforts will rut and disturb the soil, causing erosion and sedimentation problems. These problems are most severe under wet soil conditions. Topsoiling and seedbed preparation by tillage and discing loosens and disturbs the soil so that it is easily eroded. Improper timing of seeding operations will result in lack of seed germination, thereby, leaving bare slopes exposed to soil erosion. Shoulders, fill slopes, slopes of ditches, drainageways, areas around drainage structures, cut slopes, and other areas outside the rounded tops of cuts and toes of fills are also possible sources of erosion.

Quarrying impacts the soil resource by exposing underlying materials to weathering. Explosives used in this operation fracture, shake and disturb the soil causing the loosened soil and over-burden material to be susceptible to erosion. Road base courses distribute the load to the underlying soils and road surface and prevent infiltration of water into the base. The impervious surface creates a watershed which discharges onto exposed shoulders and fill slopes, and causes soil erosion and sedimentation of streams. Excessive oil application and oil spillage during surfacing operations will contaminate soil and water.

Roadside ditches which carry large amounts of water for long distances particularly on steep gradients will cause ditch and fill slope erosion. This will often result in the clogging of ditches and drainage structures, thereby, endangering the stability of side slopes on embankment and cut sections. Accelerated erosion of ditches will be caused by excessive water velocities on easily eroded soils. Construction of bridge and culvert structures will increase stream sedimentation, through equipment disturbing the streambed and stream banks, and by pushing loose material (logs, branches, and soil) into the stream during site preparation and construction. Bridge and culvert approach fills, banks, bedding and backfill material can be ready sources of soil erosion material and will sometimes constrict natural waterways, thereby, increasing the velocity of water which will cause scour and soil erosion. Culverts not properly oriented with natural stream channels and without proper inlet protection, gradient, outlet control or proper outlet discharge will cause bank erosion and scour holes at culvert outlets (Photo III-3). Such scouring and erosion will increase stream turbidity.

Improper surface repairs of dirt, gravel and bituminous surfaces will contribute to sedimentation and soil erosion through material loss, poor drainage, pot holing, stripping and rutting. Spillage or excess applications of petroleum products will sometimes result in soil contamination. Materials removed from plugged culverts and ditches will contribute to soil erosion and sediment problems if placed in unstable locations.

Equipment working in a stream to repair structures causes disturbance of the streambed and banks. Soil removed and deposited in the stream during the repairing of banks, piers, abutments and approach fills causes increased stream turbidity. Improper disposal of debris and slide material also causes stream sedimentation. Waste soil may ravel or creep downhill if steep slope gradients are involved. Chemical brush control is not usually detrimental to the soil. Mechanical brush cutting provides soil cover and accelerates the natural nutrient cycling. The equipment used, however, will cause some soil compaction.

D. Impacts on Water

Forest Development

Area burning of approximately 9,000 acres annually exposes mineral soil to precipitation that will result in surface erosion or mass wasting which, in turn, will cause sedimentation of forest streams. Severe burning can significantly increase sediment yields, especially on steep slopes in areas of heavy precipitation.[8] Sediment concentrations following hard burning may be greater than those observed on an undisturbed watershed and may persist for several years after burning, steadily declining as the exposed mineral soil becomes revegetated.[9,10] Observations made so far relative to nitrate nitrogen concentrations in steams following burning would indicate that these concentrations will be less than the limit of 10 parts per million recommended for domestic use, and below any level deemed harmful to aquatic life.[11] However, on one study area, a surge of nutrients in streams following area burning contained concentrations of ammonia and manganese that exceeded federal water quality standards for a period of 12 days.[12]

Area burning can cause significant increases in stream temperatures. Hot slash fires reduce or eliminate streamside shade with the resulting exposure to direct solar radiation which can cause increases of at least 14 degrees F. in mean-monthly maximum stream temperatures. These temperature increases will be critical to the aquatic ecosystem and survival of some aquatic life.[13]

The effects of area burning on ground water are not well documented. However, it is known that high fire temperatures at the soil surface reduce water infiltration rates by producing a non-wettable (water resistant) layer of soil beneath the ash-dust surface and the mineral soil immediately under the surface.[14,15] The water repellent layer lies parallel to the soil surface and may vary in thickness from 2 to 4 inches.[15] The presence of this barrier means that only a thin surface soil layer is available to store and transmit water during a rainstorm. Consequently, even in relatively light showers, the surface layer quickly becomes saturated producing excessive surface runoff and erosion and, of course, stream sedminentation.[16] Although no known research has been conducted on the effects of such reduced infiltration, it seems logical that if the impermeable layer is extensive the groundwater table could be significantly affected.

Area burning has not been employed as a slash disposal measure in the Taiga Sub-biome. However, the effects of a hot slash fire on water quality will be similar to those of a wildfire. A recent study of the effects of forest fires in interior Alaska indicates that significant impacts are of three kinds: [17]

- There is an increase in chemical oxygen demand concentration in streams the burned area resulting from the presence of organic material transported from the burned site to the stream systems by increased erosion.

- Potassium concentrations are higher in streams draining burned areas than in streams draining unburned areas.

- Suspended sediment increases were observed in streams during periods of high runoff immediately following the fire which occurred in August and September. This appeared to originate from the erosion of fire trails. However, the increased sedimentation was of relatively short duration.

Even though there was no statistical evidence during the sampling period that the fire had caused significant changes in the biota of the streams, there were some indications that there may have been some effects on aquatic organisms during and immediately following the fire.

It can be expected that burning will increase the amount of nutrients available to aquatic biota. Such increases can alter plankton cycles and increase or decrease plankton blooms.

The indiscriminate use of heavy equipment in scarification can cause sedimentation and turbidity of lakes and streams. The magnitude of this water quality degradation will vary directly with slope, amount of precipitation, instability of the soil mantle, and area and depth of soil disturbance.

The use of chemicals to precommercial thin young stands will not have serious impacts on water quality.

The use of chemicals in baiting, treated seed, animal repellents and weed control on some 6,300 acres annually has potential for degradation of water quality. Knowledge is lacking regarding the long-range effects of these substances on water resources. The biological significance of trace amounts of the complex carbon compounds is only partially understood, their persistence in natural waters largely unknown.[18]

The use of toxicant and repellent chemicals to protect seedlings from rodents and browsing mammals is limited to ground applications in forest nurseries and seed orchards. Under these controlled conditions, these chemicals pose no threat to water quality.

In aerial application of chemical sprays used in weed and brush and hardwood control (14,000 acres in western Oregon in fiscal year 1975 and approximately 5,000 acres annually thereafter), possible entry of chemicals into surface waters may not be recognized. Large amounts of herbicides may enter water in a short time if streams and lakes are included in treatment areas. Significant amounts of aerially applied herbicides may not reach the target area because of lateral drift due to air movement or interception by the forest canopy.[19] Only small amounts of intercepted herbicide will reach the aquatic environment due to the washing action of rainfall on the forest canopy.[20] Likewise, leaching of herbicides through the soil profile to groundwater and finally to surface waters is a slow process.[19] This indicates that the impact of herbicides on the quality of groundwater is minor. However, surface flow or runoff can move large amounts of chemicals a long distance in a short time. Chemicals moving in surface flow need not be in solution but may adhere to soil particles. Sheet erosion from areas treated with herbicides is a serious threat to the quality of the aquatic environment. Steep slopes, reduced ground cover, and compacted soils encourage surface flow of water and movement of herbicide residues. The effects of chemical application on water are summarized in Table III-2, Chapter III, L.

Concentrations of herbicides exceeding 0.1 ppm will seldom be encountered in waters adjacent to carefully controlled forest spray operations.[21] These concentrations are well within acceptable limits; however, they could have adverse impacts on aquatic biota not presently known to man. Concentrations exceeding 1 ppm have not been observed and are not expected to occur although there remains the possibility of accidental spills.[22] There remains for consideration the possibility of contamination of water by diesel oil, one of the principal carrying agents used with forest herbicides. A comprehensive review of pertinent research literature has indicated that petroleum carriers, carefully applied, present no significant threat to the quality of surface water or groundwater. One researcher found that most danger lies in careless handling of oil containers and unused oil, and in field cleaning of spray equipment.[23]

Forest fertilization of 1,500 acres in western Oregon in fiscal year 1975 involved the aerial distribution of chemicals to promote tree growth. The nitrogen is usually applied as large, specially coated urea granules (forest prills). These granules are relatively heavy and have eliminated the problems of lateral drift and foliar interception experienced in the aerial application of herbicides.[24] Thus, control of nitrogen application is relatively good; nearly all of the fertilizer reaches the target area.

The most likely route of fertilizer nitrogen entry into the aquatic ecosystem is through direct application to surface waters in the treated area. Overland flow is also a major factor in areas where surface runoff commonly occurs. Subsurface drainage of dissolved nitrogen also moves into streams. Despite the filtering effects of forest soils, measurable levels of nitrogen compounds have been found in streams monitored for water quality.[24] Several studies concerning the effects of forest fertilization on water quality revealed that the maximum standards set by the U.S. Public Health Service were not closely approached, even during the short-lived peak concentrations.[25,26] While studies of fertilization on forest waters has revealed no serious adverse impacts to date, knowledge in this area is imcomplete. Forest fertilization will not be used extensively until nitrogen fertilizer is readily available.

In the Taiga Sub-biome there have been no applications of the chemicals used in forest development and protection (except for use of fire retardants), and no chemical applications are planned in the foreseeable future. The impacts of chemicals used in forest development on the water resources of the Taiga, generally, would be similar to the effects on the Coniferous Forest Biome. However, climate and soils of the Taiga might modify these effects significantly. For example, the long duration of freezing temperatures, short growing season, permafrost and slow drainage might prolong the residual effects of some chemicals.

Protection

The use of chemicals in forest protection involves applications of insecticides, fungicides and fire retardants. Fungicides are applied in seed orchards by readily controlled ground methods without damage to water resources. Use of insecticides are not planned for use on natural resource lands in the near future. Any future use will follow guidelines established in BLM Manual 9220 - Chemical Pest Control.

Several chemical fire retardants containing ammonium and/or phosphate compounds are widely used to suppress and control forest fires.[27] Some retardants are applied by ground units or helicopters, by which maximum control and utilization on the target area can be achieved. Aerially applied retardants may enter waterways or lakes directly or by movement in surface runoff. The major affect of these chemicals on the environment appears to be their impact on water quality and on fish and other aquatic life. Kills of fish caused by field applications of retardants have been documented.[28] Laboratory tests have established that four commonly used retardants are toxic to juvenile salmonids at concentrations which could occur in natural waters as a result of field applications. Tests indicate that ammonia is the "element" of the compounds that cause mortality. Factors that affect toxicity of retardant are water volumes, water chemistry, water temperatures, and size and specie of fish.[29] Although research completed thus far has focused on the effects of retardant chemicals on fish and aquatic invertebrates, it is probable that there are significant impacts on the quality of water for domestic use and for watering of livestock and terrestrial wildlife. The colloidal materials (clays, etc.) used as carriers with these compounds are chemically harmless but could cause turbidity in surface waters. Retardant applications may have significant adverse effects on the valuable fishery and terrestrial wildlife resources of the Taiga Sub-biome.

Fire line construction will cause sedimentation and turbidity of surface water by exposure of the mineral soil to rainfall and surface runoff, thereby, resulting in erosion and soil movement into streams and lakes. The impact increases with slope, amount and intensity of precipitation, instability of the soil mantle, and area of surface disturbance. Building fire line by tractor disturbs much more surface area than does line building by hand-trailing.

In the Taiga Sub-biome, on soils underlain by permafrost, tractor-built fire lines can be particularly damaging to the aquatic environment. A study of the Taiga indicated that tractor-built fire lines contributed high sediment loads to streams. A major factor contributing to the erosion of fire lines was the melting of permafrost caused by removing the organic layer. The researchers concluded that fire control measures may cause more serious, long-term damage to the aquatic ecosystem of the Taiga than the fire itself. Back firing can have the same impact as area burning as described previously.

Cutting Practices

Clearcutting of approximately 20,000 acres annually, and to a lesser extent seed-tree cutting, causes removal of forest cover which exposes natural water surfaces to continuous, direct solar radiation. When the forest cover is removed, direct solar radiation provides much of the energy required to raise water temperature.[31] The slash and brush remaining after removal of timber may provide some shade to maintain water temperatures at relatively low levels; however, elimination of this shade by burning will sometimes expose the water surface to direct solar radiation.[18] An increase in maximum stream temperatures from about

50° F. before clearcutting and burning to about 85° F. afterward has been observed.[10] Increases in water temperature favor the growth of pathogens or various plankton and vegetation, and reduce the supply of dissolved oxygen, with adverse effects on aquatic life. Water temperature increases will also cause fish mortality, the degree of which will depend upon the fish species involved, the time of year, and the amount of temperature increase.[10]

Clearcutting on steep slopes in areas of shallow soils and heavy precipitation will often cause, after 1 to 5 years, mass soil movement resulting in sedimentation and degradation of water quality. This delayed impact is caused by deterioration of the root systems of the trees removed.[32]

Considerable logging debris will be deposited in natural waters as a result of clearcutting. This organic material contains simple sugars which are released by leaching and used as food by aquatic microorganisms. In the process, these organisms extract oxygen, thus, reducing the dissolved oxygen content of the water to levels which may be lethal to aquatic life.[33] Slash and other logging debris will often dam streams, slowing velocity and reducing turbulence. As a result, the inadequate supply of dissolved oxygen may not be replenished.[34] Such water quality degradation is evidenced by the growth of bacterial slimes and algae which thrive on the nutrients released by organic decomposition.[33]

Clearcutting and other timber harvesting methods can be beneficial in increasing the supply of water available for human use. Research shows that clearcutting properly applied has a significant potential to increase water yields from forested watersheds. Man-made openings in the forest canopy can cause the following effects:[35-38]

- Increased accumulation of snow in openings.
- Reduction of precipitation losses due to interception by the forest canopy and evaporation therefrom.
- Reduction of soil moisture losses caused by transpiration of vegetative cover.

These effects result in increased runoff and more available water.

In the Taiga Sub-biome, any cutting practice which creates large openings in the forest canopy will likely have adverse impacts on water quality. The greatest effects would be associated with clearcutting on areas underlain by permafrost. Here, exposure to direct solar radiation could cause sub-surface thawing and surface runoff from skid trails, thus, increasing sedimentation and turbidity in surface waters.

The precommercial and commercial thinning, shelterwood and selection cutting, and mortality salvage of approximately 89,000 acres annually will have minimal impacts on water quality due to limited soil and vegetative cover disturbance. Undisturbed vegetation will slow surface runoff, permit greater percolation of water into soil and will thus decrease sedimentation of nearby streams. The effects of cutting practices are summarized in Table III-2.

Logging Systems

Falling and bucking of timber causes no degradation of water quality unless trees are felled into or across surface waters. The lopping of limbs and the cutting of logs from such trees may deposit slash and organic debris in the water. This will cause a reduction in dissolved oxygen and adversely impact aquatic life.

All of the ground skidding and yarding methods carried out on about 94,000 acres annually have potential for significant adverse impacts on water quality since all cause some degree of soil disturbance. The effect is most pronounced when clearcuttings are logged by tractor, particularly on saturated, critical soils having slopes of 15 percent or more.[39] The resulting disturbance exposes mineral soil to surface erosion with consequent sedimentation and turbidity of surface waters caused by materials carried downslope in runoff. Sedimentation would have a significant adverse impact on municipal watersheds, particularly in western Oregon. The relatively short reach of the jammer makes a dense network of parallel roads necessary for effective operations. If the road system already exists, the jammer can be used without much soil disturbance. If new roads must be constructed to support the jammer operation, considerable soil will be disturbed, probably with severe impact on surface water quality.

Yarding of logs across streams or tractor skidding down stream channels willincrease stream sedimentation and turbidity. When heavy equipment enters a stream during stream clearance operations, stream sedimentation and turbidity are increased temporarily; and there is the added risk of water contamination by grease, oil and diesel fuel. Servicing and fueling of logging equipment and log trucks on forest lands adjacent to streams or lakes can also pollute water with petroleum products. In areas of steep terrain, the excavation of landings will expose quantities of mineral soil to the impact of rainfall with resulting raveling of embankments and downslope movement of sediments with surface runoff into natural waters. The logging of approximately 4,000 acres by use of aerial systems will have little effect on water quality since these systems cause little soil disturbance.

Logging operations could have severe impacts upon the fragile aquatic ecosystems of the Taiga Sub-biome, particularly on areas underlain by permafrost. Ground skidding and yarding on these sites will often cause accelerated subsurface thawing and surface runoff from skid trails, with resulting increased sedimentation and turbidity in surface waters.

The impacts of yarding operations on water quality and quantity are summarized in Table III-2.

Transportation

All of the activities associated with the construction of about 500 miles of road annually involving surface disturbance or movement of earth and rock will cause degradation of water quality (Photo III-4). These activities include clearing and grubbing, excavation and embankment, installation of culverts, quarrying and grading. The adverse effects are greatest when midslope roads are constructed by excavation of a "bench" and excavated material is wasted by sidecasting. The excavated materials may be carried downslope into watercourses by gravity, by surface erosion, or by sliding and sloughing. Excavation for midslope roads often removes material which supports unstable soils further upslope. The unstable soil mantle may subsequently move downslope as a mass, sometimes damming a stream. Studies have shown that road construction associated with logging, rather than logging itself, is the factor which causes greatest surface erosion and mass soil movement and, consequently, resulting in degradation of water quality.[9,40]

Construction of drainage ditches and bridges and installation of gabions, etc. in stream channels will cause short-term turbidity of streams. Contamination of the water by grease, oil and diesel fuel may also occur if machinery used in these operations enters the water. Improperly installed culverts will often discharge surface runoff onto fill slopes, eroding these slopes and carrying sediment into streams or lakes.[43]

The use of petroleum products (oils and asphalt) in road surfacing and surface maintenance can contaminate surface waters. Application of herbicides for roadside brush control can also pollute streams, lakes and other water bodies.[41,42] Oils and diesel fuels spilled when road construction equipment is fueled or serviced may also enter streams or lakes.

In the Taiga Sub-biome, road construction and associated actions could cause significant degradation of water quality. Removal of the insulating organic layer over permafrost will likely cause accelerated subsurface thawing, which will probably result in additional surface runoff and consequent increases in stream sedimentation and turbidity. Contamination of surface waters by petroleum products could also occur. Impacts to the Taiga, however, will be insignificant because of the current and projected low level of the timber management program.

E. Impacts on Air and Microclimate

Forest regions are products of the general climate of the earth, over which man has no real control. However, to the extent that man can destroy or conserve forests, he does control some climatic factors locally even though he does not affect the general climate over large regions. Viewed in this light, the forests of the Coniferous

PHOTO III-4: Road construction will cause surface disturbance or movement of earth and rock, thus, leading to degradation of water quality.

Forest Biome assume much greater social significance than they would have as an economic resource.[44] Nevertheless, the general climate affects forests to a much greater extent than man's activities influence climate. There is an interaction; forest conditions controlled by man affect climate locally, but general climate affects forest conditions both locally and over vast areas.[45] The climate in which a given tree or stand lives may be entirely different from the regional macroclimate. Man's activities can alter the microclimate.[46]

Forest Development

Area burning and spot burning on approximately 9,000 acres annually create smoke which is regarded in varying degrees as an air pollutant. Much of the organic matter in smoke is similar to material entering the atmosphere naturally from living vegetation or from the decomposition of vegetative material.[47] Research indicates that toxic compounds released into the air by burning forest fuels are negligible.[48,49] Various authorities on combustion of forest fuels provide the following approximate emissions for each ton of fuel burned:[30]

	Pounds Per Ton Burned		
	U.S. Environmental Protection Agency, Office of Air Programs (1972)	Darley et. al 1/	Cooper 2/
Water Vapor		About 1,000	
CO_2		1,600 - 2,500	
CO	60	40 - 140	
Hydrocarbons	20	4 - 18	
Suspended particulates	17	11 - 17	17 - 58*
Nitrogen oxides	2		

(* The 58 lbs. is for wildfire)

1/ Ellis F. Darley, Harold H. Biswell, George Miller, and John Goss. Air Pollution from Forest and Agriculture Burning. Paper presented to Western States Section/The Combustion Institute, Seattle, Wash., p. 10, April 24-25, 1972.

2/ Robert W. Cooper. Trade-Offs Between Smoke from Wild and Prescribed Fires. International Symposium on Air Quality and Smoke from Urban and Forest Fires Proceedings, Ft. Collins, Colo., Oct. 23-26, 1973 (in preparation for publication by Committee on Fire Research, National Academy of Sciences, Washington, D.C.).

There is no evidence that the combustion products of slash burning cause permanent injury to human health.[50] The corollary conclusion is that area burning and spot burning have no significant adverse impact upon air quality standards.

Area burning can, however, modify or change the microclimate. An area burn can consume organic duff, slash and brush, thus, exposing the mineral soil. In some ecosystems, the resulting climatic reaction may be favorable to the regeneration of trees.[51,52] In others, lethal soil surface temperatures or deficient moisture may inhibit the establishment of tree seedlings and favor invasion by brush.[53,54] In the Rocky Mountains, at the lower edge of the Coniferous Forest Zone, fire may so modify the local climate through destruction of cover and exposure of surface soil that plant succession may end with colonization by grasses or desert shrubs characteristic of the next lower vegetational zone. At the higher elevations, well within the coniferous forest, succession after fire will normally lead to eventual replacement of the coniferous forest itself.[55]

A recent study in the Taiga Sub-biome indicates that, on mineral soils not underlain with near-surface permafrost, spruce may be successfully harvested and regenerated by clearcutting and area burning. However, this research focused on silvicultural considerations. It did not attempt to identify the environmental impacts of logging and burning. In particular, the researcher cautions that the reactions of permafrost to harvesting and site preparation needs further investigation.[56]

Chemical and mechanical removal of brush will modify the microclimate by increasing the amount of solar radiation reaching the forest floor and by reducing soil moisture losses from vegetative transpiration. The resulting increases in soil temperature and available moisture may favor natural or artificial reforestation, or improve the growth rate of established crop trees by releasing them from competition with brush for light, moisture and soil nutrients. However, brush removal can have adverse effects on the microclimate in terms of tree growth. Research has shown that brush can have a beneficial role; e.g., in California, brush cover increased ponderosa pine seedling survival; in western Montana, more favorable moisture and temperature relations were found under brush than in open areas, and ponderosa pine seedlings planted under brush had a higher rate of survival.[57] On the lower east slopes of the Cascades in central Oregon, it was found that soil moisture and temperature conditions under brush were most favorable for survival and establishment of ponderosa pine seedlings; conditions were least favorable under grass and on open, bare ground.[57]

Reforestation and afforestation by seeding and planting on approximately 26,000 acres annually will alter the microclimate gradually until crown closure is achieved and the forest canopy is continuous. Significant changes will occur:[58]

- The mean maximum monthly air temperature in the forest will be several degrees lower than it was in the open.

- Forest soil temperatures will be slightly warmer in winter and 5° F. to 9° F. cooler in summer than in the open; and freezing of forest soil, if any, will be less deep than in the open.

- Solar intensity will be greatly reduced.

- Relative humidity of the air within the forest will be 3 to 12 percent greater than in the open, and evaporation of moisture from the forest floor will be much less than from soil surfaces in the open.

- Wind velocities within the forest will be much lower than those in the open.

Precommercial thinning increases the intensity of sunlight within the young stand, increases air and soil temperatures, and makes more soil moisture available for use by the residual trees.

Protection

Backfiring can affect the local forest climate. The effect of a light burn, confined to the forest floor, might be insignificant A hot backfire, particularly a crown fire, will kill all vegetation, consume the organic material on the forest floor, and have the impacts on microclimate described under area burning in the preceding subsections.

Cutting Practices

Depending upon the extent to which they open the forest canopy, all cutting practices affect the microclimate. The impact is estimated to be insignificant (light selection cutting), moderate (intermediate shelterwood cutting or commercial thinning) or great (extensive clearcutting). To varying degrees, each type of cutting increases solar intensity, air and soil temperatures, surface evaporation, and air movement and wind velocity; and decreases vegetative transpiration and relative humidity.

Climatic reactions upon the forest ecosystem are variable. Increased sunlight stimulates the sprouting and growth of branches on stems of trees; higher soil temperatures and more available soil moisture will often accelerate tree growth; increased wind velocities will sometimes cause wind-throw of reserved trees in a partially cut area or along the edge of a clearcutting. The altered microclimate will favor or inhibit forest regneration.

Logging Systems

Short-term emissions of pollutants from the engines of machines and dust from yarding operations will have minor effects on air quality.

Transportation

Right-of-way clearing for 500 miles of forest roads constructed annually has impacts upon the local climate which are similar to those of clearcutting. Several of the road construction activities can cause temporary degradation of air quality by emission of engine exhaust fumes and particulate matter. Dust from construction operations may be heavy locally, and its effect may be accentuated by increased movement of air and higher wind velocities in the corridors created by right-of-way clearing. Transportation of logs by truck will degrade air quality along a forest road. During dry weather, trucks operating on unsurfaced roads or on gravel surfaces will raise heavy clouds of dust. On heavily used mainline roads, dust will often be noticeable for long periods each day. Any road construction operations in the Taiga Subbiome will have important effects on local climate, particularly on soil surface temperatures and thawing a permafrost; however, these effects are presently not fully known.

F. Impact on Vegetation[59-72]

1. Terrestrial Vegetation

Certain timber management practices result in partial or complete removal of forest vegetation including the overstory, understory, shrub layer, herbaceous layer and small plants close to the forest floor. Such an impact may be considered short term since removal is followed by regrowth of residual plant species and invasion by other species adapted to open conditions. These pioneer species may be herbaceous or woody vegetation depending upon the local situation. Timber management practices also have long-term impacts because of the time necessary to restore a forest to its former state. The establishment of disclimax species and man-caused seral stages could result in a forest that is more susceptible to disease and insect outbreaks.

Forest Development

Scarification on some 1,000 acres annually, mechanical brush cutting on less than 100 acres annually, area burning on about 9,000 acres annually, and chemical weed control on 5,000 acres annually will partially or completely destroy vegetation. This impact will persist at varying degrees through several growing seasons with the most severe impact immediately following the action. Certain species may be eliminated from the site. Usually, sites disturbed by these practices will begin to revegetate naturally (in addition to planted trees) with herbs, forbs, and grasses within two weeks and, at the end of a full growing season, they will normally be stocked with a diversity of species. Thereafter, density and diversity of vegetation progresses and matures through several growing seasons until the site is fully occupied with both commercial tree species and other vegetation.

Actions applied to a lesser intensity may have short-term impacts when the removal of vegetation is limited to one vegetative layer or only a small proportion (one half or less) of the total area. These actions may include scarification in strips or patches, spot burning, burying of slash, chemical weed control of a limited number of species which restrict commercial tree establishment or growth and precommercial thinning. Mechanical trenching and furrowing, spot burning of handpiled areas, chipping and lopping of slash, hand clearing and cleaning of competing vegetation, chemical weed control by hand application, mulching, snag felling and pruning have negligible impacts on vegetation. Tree improvement, tree seeding, tree planting, baiting, fencing and screening, and fertilization should not have significant impacts on terrestrial vegetation. Their short-term impacts are related solely to reestablishment, growth and protection of vegetation.

Most development practices have beneficial, long-term impacts if they work as intended; trees will be regenerated early and grow at a fast rate thereby developing a new forest, including grasses, forbs, herbs, etc., without extensive delays (primary benefit is in restablishing forest environment). Some practices, however, may impact vegetation in the reverse of what is intended if misapplied. Examples include: (1) scarification that compacts soil or removes soil or shrub layers that provided conditions suitable for tree regeneration; (2) area burning that removes desirable shrub cover (for tree regeneration), causes soil erosion, or rapid invasion of other unwanted vegetation; and (3) chemical weed control that removes one type of undesirable vegetation only to be replaced by another undesirable type. In general adverse, long-term impacts caused by scarification and area burning are most likely to occur on "warm-dry" sites in vegetative zones of the Coniferous Forest Biome. This will be most pronounced where soils are shallow and coarse, and where the humus layer is thin or absent. Long-term, adverse impacts will also result from the use of heavy equipment on wet soils resulting in compaction. A possibility does exist that tree improvement will produce Douglas-fir trees that grow rapidly but which are not resistant to disease, drought or other destructive agents. Finally, tree planting or seeding of genetically improved stock can represent a tendency toward monoculture.

Protection

Protective measures benefit vegetation in the long term by insuring continuance of existing forest conditions. The short-term, adverse impacts of backfiring may include complete, or nearly complete, destruction of vegetation on the burned area. Fire line construction will destroy vegetation directly and also indirectly when excess erosion follows construction. Retardants have no known adverse impact on vegetation.

Cutting Practices

The short-term impact of clearcutting about 20,000 acres annually is the complete removal the upper vegetal layer and the damage to the lower vegetal layer caused by falling and yarding operations. Clearcutting will produce approximately 500 miles of cutting edge annually, thereby, exposing trees to the wind. In some cases, trees subsequently windthrown will endanger adjacent vegetation by providing a breeding ground for insects or fuel for wildfire. Clearcutting may also increase fire danger on the cut over area by exposing it to the drying effects of sun and wind. Clearcutting tends to develop stands that contain trees of approximately the same age and stands of species that grow well in full sunlight. Assuming that no artificial reforestation efforts are taken, the natural rate and degree of recovery will vary by the conditions that characterize the impacted area. Clearcutting on cool-moist sites in certain vegetative zones normally results in the natural regeneration of trees and other vegetation in less than 20 years. These zones include:

- Northwest Coastal Sub-biome
  - Western Hemlock Zone
  - Sitka Spruce Zone

- Montane Sub-biome
  - Douglas-fir Zone
  - Western Hemlock Zone
  - Mixed Conifer-Mixed Evergreen Zone

Clearcutting on cool-moist sites does not, however, produce tree regeneration so rapidly that herbaceous and other woody vegetation are excluded. However, there are instances in which this vegetation is dominant or thrives with tree regeneration. Clearcutting on warm-dry sites in the Northwest Coastal Sub-biome, Montane Sub-biome, and all sites in the Taiga Sub-biome usually results in the regeneration of herbaceous and non-coniferous woody vegetation. This situation may persist for long periods of time, often 25 years or more (Photo III-5).

The short-term impacts of shelterwood cutting on the major portion of the 70,000 acres partially cut annually are less than those of clearcutting since only a smaller portion, usually 50 percent or less of the total vegetation, is removed. Shelterwood cutting will expose large areas to wind, and any resulting windthrown trees will endanger surrounding vegetation by providing a breeding ground for insects and fuel for wildfire. Shelterwood cutting also exposes the forest to the drying effects of wind and sun thereby increasing fire danger. Shelterwood cutting will also perpetuate and spread dwarf mistletoe, thereby, damaging or killing susceptible tree species such as lodgepole pine.

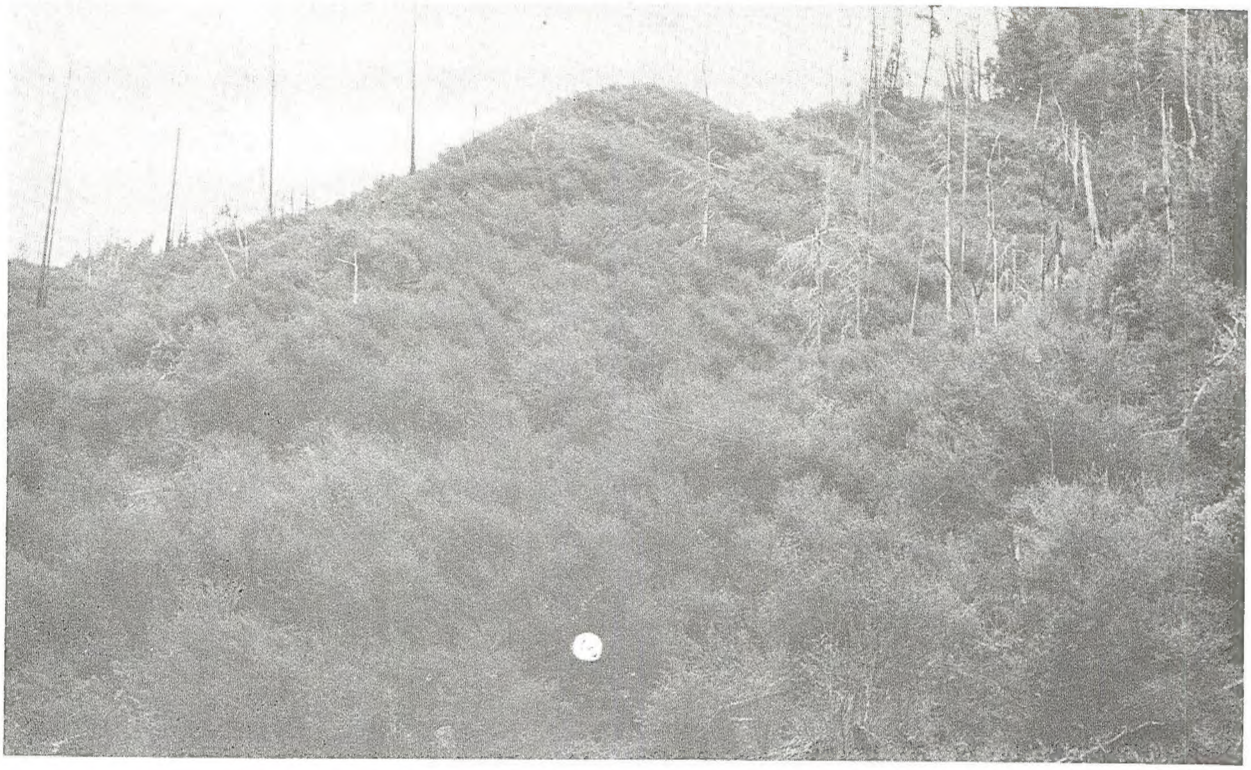

PHOTO III-5: Clearcutting on warm, dry sites usually results in the regeneration of herbaceous and non-coniferous woody vegetation. This situation may persist for long periods, often 25 years or more.

PHOTO III-6: The short-term impact of ground yarding systems such as high-lead yarding is the destruction or damage to the lower vegetal layers.

With regard to long-term impacts, shelterwood cutting results in the natural reforestation, thereby, avoiding a long period of exclusive dominance by herbaceous and non-coniferous woody vegetation. Like clearcutting, shelterwood cutting usually results in an even-aged stand but favors species better adapted to shade. Shelterwood cutting is often the only feasible means of obtaining tree regeneration in many zones, especially on warm-dry sites within the Montane Sub-biome (including the Ponderosa Pine Zone, White Fir Zone and Douglas-fir Zone). Shelterwood cutting has also provided early tree regeneration in the Northwest Coastal Sub-biome on both "cool-moist" and "warm-dry" sites. This practice opens the forest canopy and permits increased growth of herbaceous and shrub layers.

Seed tree cutting usually impacts vegetation in much the same manner as clearcutting. The trees left standing after logging are generally few in number but provide a better chance for natural regeneration and recovery than clearcutting. Short-term impacts of selection cutting are the least of any of the final harvest cutting practices since only a small amount of vegetation is destroyed or removed. Selection cutting does not normally increase the danger of windthrow, fire, or insect/disease outbreaks. However, selection cutting can perpetuate and spread dwarf mistletoe thereby damaging or killing susceptible species.

Long-term impacts of selection cutting result in uneven-aged stands composed of species adapted to shade. Tree regeneration usually occurs in small openings following harvesting; herb or shrub-dominated areas of any significant size rarely occur. The selection method usually results in the regeneration of forest trees on relatively warm-dry sites in the Ponderosa Pine Zone of the Montane Sub-biome. Selective cutting in old-growth Douglas-fir forests in the Western Hemlock and Sitka Spruce Zones of the Northwest Coastal Sub-biome often results in the regeneration of only shade-loving western hemlock and assorted species of non-coniferous woody vegetation, primarily shrubs. The short-term and long-term impacts of commercial thinning and mo rtality salvage are relatively insignificant due to the small amounts of vegetation removed or disturbed.

Logging Systems

The short-term impact of ground systems such as tractor skidding and high-lead yarding is the partial destruction or damage to the lower vegetal layers (Photo III-6). Logging will cause damage to residual trees leaving wounds that provide points of entry for disease, particularly in such species as western hemlock and white fir. Unless extensive soil compaction or loss of soil by erosion occurs, the yarding systems generally contribute to early natural regeneration of tree species by preparing a suitable seedbed. Logging methods such as horse skidding, aerial systems, balloons and helicopters do not greatly impact the herbaceous and shrub layers. Consequently, regeneration may be slowed because of poor seedbed conditions and competing vegetation. However, horse skidding, balloon and helicopter logging are currently limited to less than 200 acres per year.

Transportation

Road construction practices have a severe short-term and long term impact on vegetation. In addition to the actual removal of vegetation from the area to be surfaced, road construction frequently destroys vegetation over extensive areas below the road cut or fill where sidecast material (soil, rocks, brush, logs) is pushed by tractors, dumped by trucks or blasted by explosives. Land covered by sidecast is often much slower to revegetate due to sterility of the material and depth to which it covers residual vegetation. Sterile material impedes revegetation by invading plant species, and deep coverings of residual plants impair their ability to resprout. Land covered by the road surface is permanently a non-producer of vegetation except for small, isolated spur roads that are sometimes abandoned. Even the latter, however, will be incapable of producing vegetation similar to adjacent land due to the road's compacted conditon. Roads also provide positive, long-term benefits by serving as the means by which men and equipment are moved into the forest to protect vegetation from fire and insects, and conduct reforestation efforts as well as provide access for the public.

2. Riparian and Aquatic Vegetation

Forest Development

Practices such as seeding, planting, mulching, pruning, burying, precommercial thinnings, and hand clearing and cleaning do not usually have an impact on aquatic vegetation. Uncontrolled precommercial thinnings, cleaning and clearing will remove some valuable riparian vegetation. Mechanical brush cutting along streams will temporarily damage riparian vegetation and aquatic plants. Chemicals used to control weeds will kill desirable riparian and aquatic vegetation. Area and spot burning will cause short-term, adverse effects on riparian and aquatic plants by killing them if area and spot burning is done along streams or beside lakes and marshes. Extensive snag felling into streams or lakes will result in the immediate death of some aquatic plants and long-term environmental changes detrimental to other plants due to decomposition of organic material.

The addition of nutrients through fertilization to neutral waters will benefit aquatic plants by increasing their growth. Nutrients carried into lakes, reservoirs and ponds, however, will intensify problems caused by aquatic plants where receiving water is already rich in nutrients. In such instances, excessive algae blooms will lower water quality standards below that acceptable for human consumption and affect recreational and fisheries' values.

Reduction or modification of riparian vegetation will significantly affect stream temperature, aquatic fauna and food chains, stream habitat, and the habitat and migration routes of many forms of wildlife.

Protection

Use of *insecticides or fungicides* to protect forests will have a direct impact if the chemicals used are lethal to aquatic plants. *Fire line* construction and *backfiring* will sometimes destroy aquatic vegetation, especially in the Taiga Forest.

Cutting Practices

Cutting practices which remove most of the timber adjacent to aquatic ecosystems will have a direct impact on aquatic plants. *Clearcutting* along streams or around lakes, ponds and marshes causes immediate loss of riparian vegetation and aquatic plants more so than other cutting practices. Extensive clearcutting in a watershed will often result in undesirable algae blooms, particularly if large increases in water temperatures occur as a result of the cutting practice that removes the riparian vegetation. Under some situations, cuttings that result in slight increases in water temperature and more light penetration will benefit aquatic plants by creating better growing conditions. Light cuttings such as *commercial thinning*, *selection cutting*, or *sanitation-salvage cutting* have minor impacts on aquatic plants.

Logging Systems

Timber *falling* and *bucking*, by itself, has no immediate impact on aquatic vegetation unless trees are felled into the riparian and aquatic habitats, thereby, destroying valuable plants. Long-term, adverse effects will occur if debris, slash and tree tops are not removed during logging.

Both short-term and long-term, adverse effects on riparian and aquatic plants occur when logs are *skidded* across streams or wetland, resulting in sedimentation of both running and standing waters. Excessive sedimentation accelerates the natural process of plant succession. This may be beneficial in some developing ecosystems, but sedimentation in most cases is considered detrimental because it reduces the quality and amount of aquatic habitat in the total environment. *Crawler tractors* the *downhill high-lead logging operations* generally cause more sedimentation than other ground systems of logging and would, therefore, have the most adverse effects on aquatic plants. *Aerial systems* will cause less sedimentation and loss of aquatic plants than ground systems of logging because logs are partially or totally suspended above the ground during yarding.

Transportation

Studies have shown that more sedimentation of aquatic habitat results from *road construction* and *maintenance* than from yarding operations. (See long-term impact of sedimentation on aquatic plants as discussed above.) Riparian and aquatic vegetation will suffer both short-term and long-term, negative impacts whenever construction occurs adjacent to or in waterways. Riparian and aquatic plants will sometimes be damaged or removed by clearing and grubbing, excavation of all types of material, and embankment and channelization of streams. Installation of structures in streams will have a slight, negative impact on aquatic plants at the construction site. Road locations without adequate buffer areas between the road and stream will have the greatest, adverse impact on riparian and aquatic vegetation.

Maintenance

Maintenance of roads and structures will cause additional sedimentation in water courses which shorten the gradual succession of plant communities. Clearance of landslides from roads will be detrimental to plants if soil and debris are sidecast into streams. Aquatic plants will be damaged by chemical applications to control brush along waterways.

G. Impact on Animals

1. Wildlife - Terrestrial [73-76]

Forest Development

Tree improvement practices will increase the growth rate of coniferous forests, thereby, adversely affecting browsing animals, such as deer, by reducing the time that they can use the reforested area. Forest-dwelling species including some birds, small mammals, and mammalian predators will benefit through the cover afforded by rapid forest regeneration. Scarification, mechanical brush cutting, burning and chemical weed control, etc. will have a temporary, adverse impact on small, ground-dwelling mammals such as rabbits, mice, moles, shrews, and a few ground-nesting birds such as mountain quail and grouse, and on deer and elk by eliminating brush cover. Where chemical toxicants are used to kill vegetation, sources of food and cover will be reduced. The burning or burying of brush and logging slash will be detrimental to small, ground-dwelling or nesting mammals, birds, reptiles and amphibians but will generally be beneficial to larger animals since it will permit ease of movement and permit the growth of a valuable browse or cover species. Chemicals such as 2,4-D and Atrazine will destroy the cover used by small mammals, amphibians, and reptiles. Use of chemicals will deny wildlife use of extensive areas during crucial periods in the winter and spring. Use of defoliants such as 2,4-D in large stands of alder and other hardwoods will remove necessary escape cover used by deer, elk, and other animals and birds. Use of Atrazine will at times be beneficial to browsing animals by removing grass competition with browse species.

Seeding and planting promotes or augments natural reforestation and will often reduce the time interval of natural regeneration (see tree improvement above). If the seed or planting stock is treated with non-toxic repellents, such as Thiram, there will be little effect on wildlife.

Baiting will be most detrimental to many small rodents including mice, some shrews, ground squirrels, woodrats, porcupines, hares and rabbits, and mountain beaver. Moles and gophers may also be controlled through poison baits. If strychnine is used, predators, either avian or mammalian, will sometimes be killed by the secondary effects of the baits after eating dead or dying rodents that have ingested the poison baits. Herbivores will at times benefit through the baiting and subsequent control of overpopulations of mice, rabbits, and gophers that may destroy browse species by girdling. Fencing and screening will be detrimental to animal movements if conducted on an extensive basis. Little impact would occur from screening of individual trees, but extensive fencing can interfere with normal animal movement and may entrap the young of deer and elk. Adult animals can become entangled in nylon-mesh fencing used on some planting sites.

Snag felling will adversely impact many birds and small animals since snags are used for denning, nesting, and food storage. In addition, spike top trees and large dead snags are needed near eagle and osprey nest trees for perches and for the young to use when learning to fly. Larger, dead snags or hollow trees may be used by furbearers including some of the larger predators. (See remarks under cutting practices.) Snags and dead trees also harbor insects that furnish an extensive food supply for many insect-eaters including woodpeckers and creepers. Applications of "superphosphates" and other high-nitrogen-content fertilizers increase the palatability and general use of most plant species by herbivores and rodents. Precommercial thinning and pruning will benefit wildlife dependent on a brush understory by opening up the canopy and allowing sunlight to reach the forest floor. Since sunlight influences both the quantity and quality of forage, browsing animals will generally benefit from thinning practices. This favorable impact, however, will be partially offset by the removal of hardwoods or conifers useful as a food source. Chemicals used for precommercial thinning will sometimes be ingested by wildlife, thus, causing illness or death. The magnitude of this impact, however, is not considered serious.

Protection

The control of an insect pest species by another insect species is generally of no consequence, from a wildlife standpoint, beyond the immediate effect of the predator on the prey. Habitat used by wildlife can be destroyed by infestation of borers, leafeaters, sap feeders, and other insect pests. Webworms may destroy forage needed by wintering deer, but the caterpillars may in turn provide a valuable food source for many insect-eating birds. The use of chemical insecticides is of more immediate consequence to wildlife. The use of DDT, for example, has had adverse effects on many forms of bird life by killing them outright, eliminating food supplies, or disrupting their reproduction. Other insecticides used to control damaging species will also kill non-target insects including predatory species.

Cutting Practices

Nearly all wildlife are initially affected adversely by the sudden impact of timber harvesting. The immediate removal or destruction of habitat including nesting, fawning, calving, wintering, and escape cover will result in the displacement or actual loss of birds and animals. The degree and length of impact is influenced significantly by the timing of harvest, developmental or protection operations. Timber management activities conducted during breeding, nesting, fawning or calving season or near critical wintering areas, for example, will cause severe disruption and impact to wildlife species because of their vulnerability to changes in habitat, food sources and life functions during these periods. Activities during these periods will also cause loss of adult animals, their young or unborn offspring. For many highly territorial wildlife, such as the spotted owl and cavity-feeding birds, displacement can be as fatal as the actual harvesting effects. This sudden, violent impact is of relatively short duration except in biomes where vegetative recovery is slow or management is changed from old growth to young, even-aged stands. Differences between cutting practices is a matter of degree with clearcutting and seed tree cutting generally the most damaging, and selective cutting the least damaging. Shelterwood cutting probably occupies a model position in this regard. Some species of wildlife, however, are quite tolerant of the actual removal of the forest overstory and subsequent human activity. Such animals as deer, elk, rabbits, grouse, sparrows, thrushes and wrens will respond favorably to the removal of timber and the subsequent increased availability of nutritious browse, berries, grasses and forbs. On any specific area, this beneficial effect will be most prevalent during the first 10-years following harvesting and will progressively decrease thereafter as browse, berries, forbs and grasses are shaded out by the closing forest canopy. The regulated forest as a whole, however, will have a balance of age classes so that approximately one-eighth(based on 80 year rotation) of the total area available for timber production will be in the 0 to 10-year age class, one-eighthin the 10 to 20-year age class, etc. As necessary, particularly in the younger forest age classes, intensive management activities, i.e., brush and hardwood control and grass control, will be employed to reduce competition for moisture, light and nutrients. Chemicals used in such activities are generally selective and thus will only destroy a portion of the wildlife habitat and food source. Such effects are also temporary as the site is subsequently reinvaded by the same or similar plant species. Rodents including ground-dwelling squirrels, mice, and rabbits usually increase with brush regeneration following logging. Consequently, small predators that prey on these rodents will also benefit.

Regardless of the cutting practice employed, the harvest of old-growth forests will have an adverse impact on northern spotted owls, goshawks, Cooper's hawks, sharp-shinned hawks, eagles, and other species associated with old-growth stands due to the destruction of their unique habitat and the accompanying reduction in food supplies. Since these old-growth ecosystems will not be replaced over time, both the short-term and long-term effects will be to reduce and in some instances eliminate certain species populations such as the northern spotted owl (Photo III-7).

Roosevelt elk are usually benefited by timber harvesting activities if they consist of scattered, small clearcuts under 40 acres in size. Rocky mountain elk avoid timber harvesting activities and, therefore, will be impacted more from continuous and extensive partial cutting rather than the short-term harrassment from clearcutting. Large slash and forage logs benefit woodpeckers and other birds, but large debris will be a problem in watershed and aquatic habitat management if the debris reaches streams during severe flooding.

Most large mammalian and avian predators are adversely affected by noise, extensive loss of cover and accompanying human activities. In general, both clearcutting and partial cutting practices affect wildlife species (to varying degrees) prior to return to a closed canopy. The following table summarizes the overall effects (in terms of either a positive or negative impact) on selected wildlife species.

Positive Impact	Negative Impacts
Mammals	
Deer (blacktailed & mule)	Bear
Roosevelt elk (1)	Cougar
Snowshoe hares	Wolf
Ground squirrels	Lynx
Mice	Mink
Moles	Fisher
Bobcat	Marten
	Wolverine
	Tree mice
	Flying squirrel (2)
	Mountain Beaver
	Shrew

(1) Rocky mountain elk usually respond favorably to some openings of closed-canopy overstories, but are much less tolerant of human activity than are Roosevelt elk. Both animals must have escape and wintering cover interspersed with forest openings.

(2) Many small mammals, small owls, and woodpeckers are indirectly affected by logging where the cutting of merchantable trees also means the loss of snags and dead trees. Other birds dependent on cavity nests include tree swallows, titmouse, creepers; and near waterways, wood duck, bufflehead, golden eye, and the hooded merganser. Animals can include squirrels, mice, fisher, marten, bats, raccoons, ringtailed cat, and bear.

Birds

Blue grouse
Ruffed grouse
Mountain quail
Bandtailed pigeon
Sparrows
Thrush
Wrens
Junco
Warblers

Eagles
Ospreys
Northern spotted owl
Chickadees
Nuthatches
Winter wren
Accipiter hawks
Franklin's grouse
Dippers (water ouzel)
Woodpeckers (2)

Amphibians and Reptiles

Toads
Lizards
Garter snakes

Salamanders
Tree frogs

(2) Many small mammals, small owls, and woodpeckers are indirectly affected by logging where the cutting of merchantable trees also means the loss of snags and dead trees. Other birds dependent on cavity nests include tree swallows, titmouse, creepers; and near waterways, wood duck, bufflehead, golden eye, and the hooded merganser. Animals can include squirrels, mice, fisher, marten, bats, raccoons, ringtailed cat, and bear.

Logging Systems

Ground systems that disturb the soil stimulate browse production favorable to herbivores and, therefore, provide some benefits. In general, crawler tractor skidding, high-lead yarding, mobile yarders, and jammers create soil disturbance beneficial to animals dependent on grass and browse production. Small mammals and ground-dwelling birds, amphibians, and reptiles will obviously be destroyed or temporarily displaced by this type of operation. Most wildlife benefits, however, will accrue from horse skidding and skyline, balloon and helicopter yarding which cause a minimum of disturbance. Again, slash distribution and disposal are of importance; much unburned or untreated slash impedes movement of larger animals such as elk and deer but encourages mice, ground squirrels, rabbits, hares, and other small mammals and birds that are normally found at or near ground level. Supposedly, the aerial types of yarding would be less prone to destroy snags and dead trees through normal logging attrition than would the high-lead and ground-skidding systems. As mentioned previously, snags and dead trees are of great importance to many birds and mammals. Another prime importance of aerial yarding is that its use precludes much of the road construction necessitated by more conventional methods. Roads greatly reduce the available wildlife habitat, and cause many species to abandon former habitat because of increased human activity.

PHOTO III-7: The Northern Spotted Owl is one of several wildlife species which are territorial and depend upon old-growth forests.

Transportation

Probably the greatest negative impact on wildlife stems from road construction especially from those constructed through meadows, marshes, bogs and other valuable or critical wildlife habitat. As with timber harvesting, there is an initial, sudden and disruptive effect on nesting and sometimes wintering wildlife. Also, road right-of-way permanently removes thousands of acres of wildlife habitat, encourages harrassment of wildlife through ease of vehicular access (including off-road vehicles), and precludes use of areas to wilderness-inhabiting species. While the larger predators both avian and mammalian are the most adversely affected, few wildlife species are directly benefited by road construction and use. Obviously, some "edge" effect along roads is created in closed-canopy environments that will be used by some species of birds and animals. The deer or grouse using roadside grass-legume and bank stabilization seedings may be killed by vehicles or road hunters.

2. Wildlife - Aquatic

Forest Development

The impact of some development practices generally has a stabilizing effect on the watershed, riparian vegetation, and the stream channel. Specific actions such as seeding and planting tend to improve the watershed and basic water quality over time, thus, benefiting aquatic animals. However, actions such as mechanical brush cutting, trenching and furrowing, scarification, burying slash, and precommercial thinning will cause short-term water quality problems associated with siltation and streambank degradation. Debris will often be deposited in the streams resulting in a reduction of the oxygen content of the water and blocking fish passage.

Area burning and spot burning of piles and concentrations of slash will likely cause water quality changes if the work is immediately adjacent to streams. Impacts will be temporary, lethal increases in water temperature and additions of chemicals or ash directly into the water. Chipping or lopping of slash hand clearing, hand cleaning, and pruning could add to the organic load of the streams, thereby, reducing oxygen content. Weed control, precommercial thinning and baiting, when conducted with chemicals, will cause direct kills of fish, clams, mussels, crustaceans, and aquatic insects and will drastically harm aquatic communities.

Fencing and screening could have a positive impact by protecting overhanging streamside vegetation that provides habitat for terrestrial insects which in turn fall into the water and become food for fish. Snag felling directly into streams will cause blockages to fish migration and add to the organic load in the water. Controlled snag felling operations will have a positive effect by providing larger aquatic animals, such as fish, additional cover in open streams.

Fertilization of watersheds will result in a buildup of nutrients in lakes or reservoirs in the watershed. The small addition of nutrients to some lakes already undergoing eutrophication might amplify water quality problems and cause negative results on aquatic environment. The aquatic biota in neutral waters in the Taiga Forest and high elevation areas of the Montane Forest may actually benefit from increasing nutrients by more rapid growth of aquatic plants and animals. The physical operations of moving fertilizer and the chance of accident near streams could result in a detrimental impact on aquatic resources.

Protection

Forest protection actions concerned with control of insects and disease through predators and viruses will have little direct effect on larger aquatic organisms such as fish. A drastic reduction in the amount of terrestrial and aquatic insects will however, have an adverse impact on fish and crustaceans by reducing the insect population used as a food supply by fish. Reduction of insects through insecticides may have two-fold impacts on aquatic organisms. First, they will be toxic to some forms of aquatic life. Second, those organisms dependent on terrestrial and aquatic insects for food will die from lack of nourishment. Fungicides will normally have a direct impact, and then only if the chemicals are toxic to aquatic organisms. Use of insecticides to maintain the general health of the forest preserves protective vegetation and thus stablizes watersheds and water quality, with a beneficial long-range impact on aquatic wildlife. However, the use of any toxic chemical will have significant impacts on aquatic organisms.

Fire suppression activities will have detrimental impacts on aquatic animals and organisms. Studies are currently being conducted to determine the nature and extent of the impacts of chemical retardants on water and aquatic environments.

Fire line construction, especially with track vehicles, will cause subsequent erosion problems, particularly on steep slopes. The Taiga Forest is probably the most delicate area for fire line construction. In permafrost areas, disturbance or removal of the vegetation exposes frozen surfaces that quickly thaw and may, thus, cause erosion problems. Consequently, water quality in receiving streams is degraded, and siltation will often smother aquatic organisms and destroy spawning grounds of some salmonid fish.

Post fire operations often result in the salvage of merchantable trees. Such operations can result in impacts similar to those of other logging operations.

Backfiring will sometimes cause destruction of riparian vegetation and result in degradation of water quality, thus, impacting fish and other aquatic animals.

Cutting Practices

The primary impacts on aquatic animals from various forest cutting practices occur as a result of the removal of protective vegetation along streams and the deposit of debris and sediment in streams (Photo III-8). Commercial thinnings, intermediate shelterwood cutting, selection cuttings and other partial cut methods probably have the least impact on water quality and streamside environment. In fact, water quality could be improved as a result of these practices by subsequent increases of vegetation on the forest floor and protection of the watershed. Clearcuttings will often have an immediate, detrimental impact on water quality in areas where trees adjacent to the stream or river are removed. Removal of the forest canopy and riparian vegetation will cause increases in water temperatures sometimes exceeding optimum conditions. However, the addition of nutrients and the higher water temperatures will be beneficial by increasing aquatic biota productivity, particularly in cold, infertile bodies of water. Any erosion originating on the clearcut area will often result in the degradation of water quality in adjacent water bodies by sedimentation and siltation.

Increased water yield resulting from harvest operations, particularly clearcutting, will increase the volume and rate of surface runoff. These increased volumes and rates will cause stream channel scouring and will increase organic matter and debris loads in the streams. Consequently, ecological balances within the stream ecosystem will be impacted; some species will benefit while others will be adversely affected.

Logging Systems

The impact of falling and bucking on water quality and aquatic environment will cause short-term problems. Falling methods that concentrate trees and debris in streams cause adverse impacts by increasing the organic matter which in turn reduces oxygen content of the water. Debris also causes stream blockage. Accidental spills of oil, gasoline, and other materials used with falling equipment may pollute tributary streams and be toxic to aquatic organisms.

The movement of logs by ground skidding or yarding operations will have a significant impact on the quality of water in streams and lakes by adding sediment, thereby, causing siltation and excess turbidity, especially during periods of heavy runoff. Streambanks and stream bottoms could also be damaged and scoured. The greatest impact will be caused by crawler tractor skidding resulting in erosion and severe disturbance of the soil mantle. Horse and rubber-tired skidding have a lesser impact on the soil, consequently, reducing impacts to stream environments. Various types of skyline systems have few direct impacts on aquatic habitats.

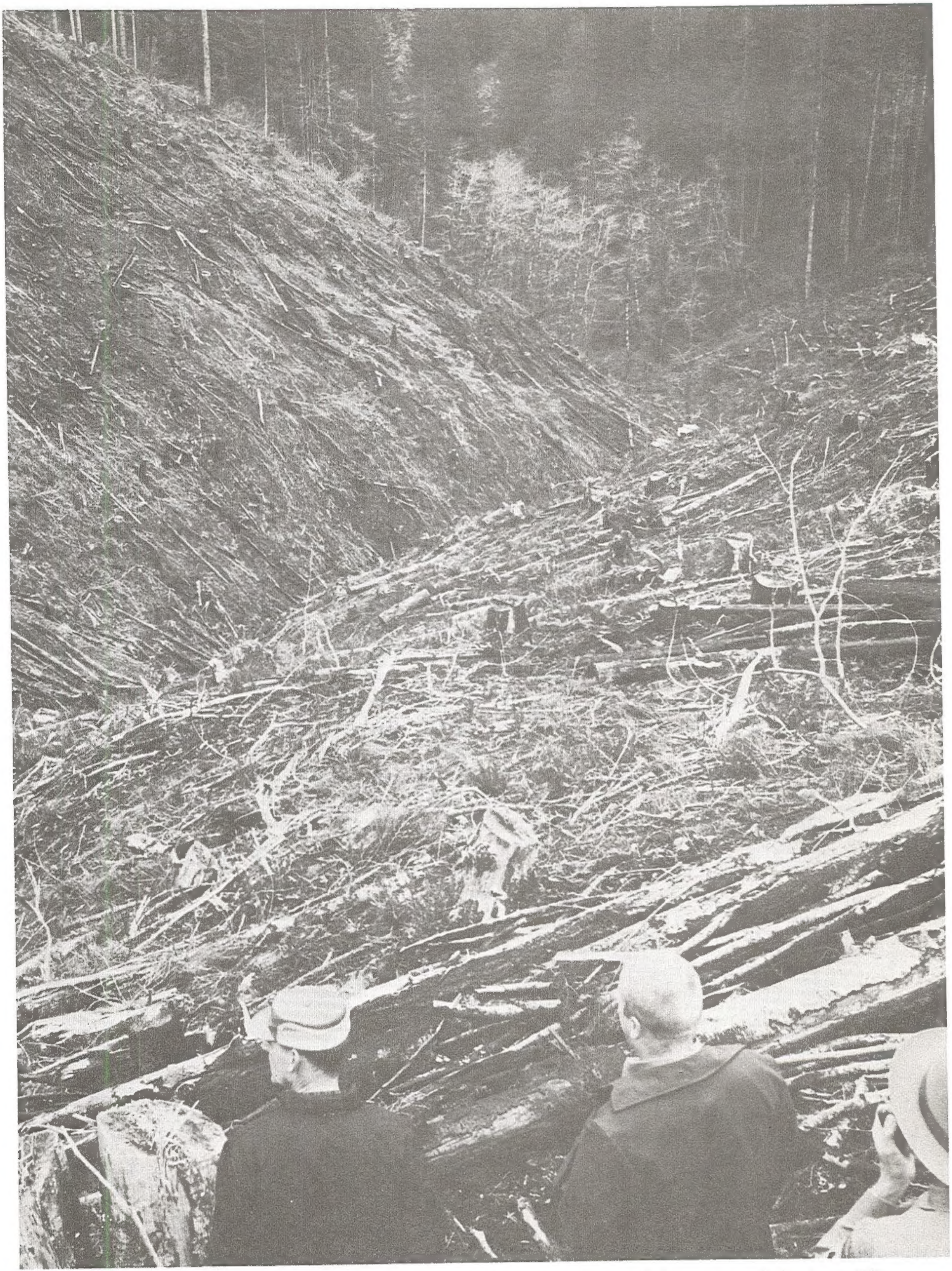

PHOTO III-8: Tributary stream showing accumulation of logging debris. If debris is not removed prior to rainy season, debris may cause scouring of streams, log jams, and obstruction of culverts and bridges which will prevent free upstream movement of anadromous fish.

Large amounts of debris left in streams following logging operations will be destructive to aquatic animals, especially fish, clams and mussels, aquatic insects, and crustaceans. Debris in streams will result in lower dissolved oxygen, increased water temperatures, and physical damage to the stream bottom and banks. Large logs and heavy debris left in steep draws and along streambanks will often cause long-term drainage problems which result in destruction of fish populations and stream habitat. Washouts of drainages blocked by logging debris, during periods of heavy precipitation, cause complete destruction of the aquatic habitat. Offsite degradation from sediment and debris is common in lower river systems and estuaries. Debris jams cause blockages to the upstream migration of fish and will deprive the fish from reaching historic spawning grounds. Anadromous fish are extremely vulnerable to these impacts.

Transportation

Studies in most western states indicate that road construction can have the most serious impacts on water quality. The impacts are primarily associated with soil disturbance during the construction phase. The action will often result in stream channel changes, blockages to fish, and addition of sediment load to streams, thereby, reducing aquatic organisms. There are also drastic changes in the aquatic habitat which, in turn, causes reduction in spawning success and affects the condition of higher animals such as fish. Debris from clearing and grubbing also causes stream blockages and temporary increases in turbidity. Excavation of earth and rock, if done near streams, will add silt load and increase turbidities which are destructive to aquatic organisms. Removal of spawning gravels will destroy spawning grounds for both anadromous and resident fish. Rock and gravel areas also provide habitat for aquatic insects. Therefore, removal of the gravels will reduce insect populations, thereby, removing an important food source for other aquatic organisms. Improper embankments, compacting and grading will cause subsequent erosion that adds sediment to streams and impairs the habitat requirements. Stabilization techniques usually have a postitive influence on aquatic animals by improving water quality.

Rock crushing may require washing operations. Where used, the resulting sediment load "wash" waters will reach streams and smother habitat of aquatic insects, mollusks, and crustaceans. Spawning gravels will be covered with fine material and water quality degraded. Bases and surfaces of roads may contain materials which, if washed into streams, will be detrimental to aquatic organisms (e.g., clay and dirt surfaces that deteriorate during periods of heavy rainfall or freezing and thawing).

Drainage ditches and culverts will concentrate runoff on erodible fill areas causing sedimentation in nearby streams. Structures in streams (including intermittent streams) such as culverts, bridges, fords, and other crossings may become impassable barriers to migrating fish. This may be caused by restricting channels, placing culverts on steep gradients or by placing culvert outlets too high for migrating fish (Photo III-3). Construction in streams at improper times and exposing materials such as portland cement and asphalt will often cause fish kills. Mass soil movement and sediment resulting from roads will cause sedimentation in estuaries and will impact their respective biota.

Maintenance

A variety of impacts to fish and other aquatic organisms will be caused during maintenance of roads, trails, and other access routes. Drainage structures may be altered on roads causing undue addition of silt and debris in streams. Repair of structures on stream crossings or of riprap will cause destruction of spawning beds or delay migration of adult anadromous fish. The sidecasting of debris and slide material into streams will cause degradation of water quality for several miles downstream. Removal of vegetation along roads near streams will increase water temperature. Herbicide used for roadside brush control may enter streams and kill aquatic animals.

3. Domestic Livestock

Development

In general, there will be little impact on livestock grazing due to the limited use of the intensive timber management areas by cattle, sheep or horses. The process of mechanical brush cutting has a temporary, disturbing effect on domestic livestock grazing. This effect is minor, however, when compared with the more postitive benefits of the practice. The removal of brush eliminates obstacles that restrict or hinder animal movement. It also removes vegetation that is undesirable to domestic animals and provides stand conditions favorable for forage plants. As a result, the area can be used by a greater number of livestock. Area burning has a disturbing effect on grazing animals in the vicinity of the burn. However, it removes debris and other materials of little value for forage. The removal of this material provides additional space for the development and reproduction of grasses and other desirable forage species. Chemicals used for the control of herbaceous vegetation will sometimes have an adverse impact on grazing animals by changing the distribution and composition of forage plants. The application of some chemicals will kill desirable forage species while other chemicals will eliminate undesirable competing vegetation, thus, improving the quality and quantity of livestock forage available. The consumption of chemically treated forage plants may have a direct, adverse impact on the grazing animals themselves. Fencing and screening will restrict the movement of livestock and reduce the area available for grazing use. In some cases, important watering sources will be fenced out, thus, reducing the amount of grazing use that could be made on adjacent areas. Fences properly located will be used to manipulate grazing animals in a systematic method, thus, benefiting the vegetation and related resources and the livestock.

Protection

There are several protection practices that will have an impact on sheep, cattle, and horses. However, at this time not enough is known to evaluate either the positive or negative impacts. For example, the use of insecticides and fungicides could directly affect plant species important for livestock forage. The consumption of plants treated with an insecticide or fungicide could affect the health and well-being of the livestock. The impacts resulting from protective actions will depend upon several factors such as the season, amount, and frequency of their use.

Cutting Practices

The various cutting practices result in partial to complete, or nearly complete, removal of forest trees and other vegetation. Long-term effects on domestic livestock vary according to the practices employed. A closed-forest canopy shades the site so that it produces few desirable grass or forage species suitable for use by livestock. Also, the abundance of trees and vegetation tends to hinder or restrict animal movement. Management and cutting practices that open up the stand provide space for the growth and reproduction of desirable forage plants and allow for free animal movement. In general, the more open the forest canopy the more grasses and other forage plants that are available for domestic livestock grazing use.

Logging Systems

Logging activities which disturb the soil affect livestock forage conditions and the livestock themselves. These effects vary with the type of logging methods used and with rehabilitation measures undertaken. Logging activities will often result in adverse impacts to livestock if skid trails and other disturbed areas are not rehabilitated by reseeding or other measures that will stabilize the soil and encourage the production of livestock forage. Such areas, if properly protected and managed, will increase in value for domestic livestock grazing purposes.

Transportation

Road construction, logging, and hauling activities with their attendant noise and human activity will affect the free movement of livestock. Adverse effects of a more permanent nature result from land removed from production in the construction of roads, trails, and landings. Adverse effects will also occur in areas where severe soil disturbances cause landslides and topsoil loss.

H. Micro and Macroorganisms

1. Soil Organisms

While some practices will have a beneficial impact on soil organisms, others will be detrimental to the extent that populations will be decreased or imbalances created. Normally, reductions in populations will result in lesser amounts of nutrients being made available to the producers. This, in turn, will reduce the productivity of the biotic community. Conversely, increased populations will usually result in more nutrients being available to members of the biotic community, either directly or indirectly. In general, those practices that reduce soil moisture, diminish carbon supplies, or affect soil aeration through compaction will have an adverse impact on soil organisms. However, this impact will usually be of a short duration because of the dynamic re-productive characteristics of these organisms. As a cautionary note, however, it should be pointed out that the state of knowledge regarding the relationship of many practices to soil organisms is not very far advanced.

Forest Development

Severe burns caused by area and spot burning may have a short-term, adverse effect. Research findings generally suggest that burning has the greatest impact on microbiological activity in the upper layer of the topsoil. Intensity of burning was important in determining if microbiological properties of the soil were altered. In most cases, unburned and lightly burned soils exhibited little difference in numbers of organisms or ratio of bacteria to actinomyces. Following an initial reduction, marked increases were noted two years later in the microbiological populations of severely burned soil.[77]

Any areas that become compacted by heavy equipment in the course of scarification or mechanical trenching and furrowing result in reduced populations of organisms. Massive spills of toxicants during chemical weed and brush control will have severe, adverse impacts through soil sterilization. Fertilization, chipping, or lopping of slash, seeding, and planting will have both beneficial short-term and long-term impacts on soil organism populations. Hand clearing and cleaning, precommercial thinning, and pruning are not expected to have any significant impact.

Protection

Excessive amounts of insecticides, fungicides and other toxicants will have an adverse effect throughout the "life" of the chemical. Large spills will increase this impact. Compaction and erosion resulting from fire line construction will have short-term, adverse impacts. As in other actions causing soil erosion, the impact will be increased an lengthened in the Taiga Forest where climatic and soil conditions limit soil organism numbers.

Cutting Practices

Partial cutting practices such as commercial thinnings, shelterwood and sanitation salvage will have little impact on soil organisms. Due to decreased soil moisture content particularly in the Montane Forest, clearcutting and seed tree practices will temporarily reduce soil organism populations.

Logging Methods

The use of ground systems such as tractor and high-lead logging on erodible sites will have detrimental impacts because of the loss of the organic layer. The impact will be expanded on tractor operations as a result of soil compaction. Aerial systems will have minor impact on soil organisms except on the landing areas where oil and gas spillages, topsoil removal, and compaction will occur.

Transportation

Both short-term and long-term, adverse impacts will result from road construction practices that remove the topsoil, compact the soil (thereby reducing aeration), or decrease soil moisture content. Areas under roadbeds will be impacted during the life of the facility, and any continuing erosion will have long-term effects.

2. Aquatic Organisms

Any of the timber management practices that affect water quality will have a direct effect on aquatic plant and animal populations. Some timber management activities will have a positive impact, but many actions will result in aquatic organism population changes which in turn will impact other animals depending on these organisms for food. Because all aquatic environments are affected and many aquatic organisms cannot tolerate substantial increases above the natural geologic rate of sedimentation, increased sedimentation is one of the most serious possible impacts.

Development

Practices that will cause short-term, adverse impacts on water quality and also microorganisms include chemical weed or brush control, area and spot burning (if adjacent to streams), scarification and mechanical brush cutting (if beside streams), snag falling (if in waterways), and hand clearing and cleaning (if along streams).

Activities that tend to stabilize watersheds will have a positive impact on aquatic organisms. Such actions include seeding, planting, mulching, fencing and screening. Fertilization will be beneficial by stimulating growth of phytoplankton, especially in some neutral waters of each sub-biome. Fertilization of young trees will cause some negative impacts if receiving waters (especially lakes or ponds) are already rich in nutrients. In these cases, dense blooms of algae will likely cause undesirable tastes or odors in drinking water and interfere with swimming or fishing. Profuse growths of phytoplankton and other aquatic plants will also cause fish kills due to oxygen depletion.

Protection

Use of insecticides and some herbicides will kill zooplankton, and fungicides will be directly toxic to phytoplankton. Toxicity may persist throughout the life of the chemical. Loss of these basic food items will indirectly affect all aquatic animals. Fires have an adverse, short-term effect on water quality and minute plants and animals. Fire suppression activities will also cause adverse effects on aquatic microorganisms if retardants are dropped directly into water or on vegetation along streams and around lakes. Backfiring will also destroy riparian vegetation and cause burning material to fall into waterways. Fire line construction often causes increased sedimentation of aquatic habitat and damage to aquatic organisms.

Cutting Practices

Adverse impacts on small, aquatic organisms are caused by cutting practices which (1) permit trees to be felled into streams or lakes, thereby, altering habitat and creating organic changes in water quality; (2) remove streamside vegetation, thereby, opening the canopy, exposing water to direct sunlight and increasing water temperature; and (3) damage streambanks and beds, thereby, increasing sedimentation. Clearcutting usually causes the greatest impact when the trees adjacent to a water body are removed. Lighter cuttings such as sanitation-salvage, selection cutting, or preparatory shelterwood cuttings will generally have minor impacts on aquatic organisms.

Logging systems

Short-term, vegetative impacts on aquatic microorganisms occur when trees are felled into the aquatic habitat. The increased water temperature and presence of organic matter reduce the amount of dissolved oxygen available for plants and animals. Conditions will deteriorate further if petroleum products used for machinery are allowed to enter streams during logging operations.

Logging operations causing the greatest amount of soil and habitat disturbance usually have the largest impacts on aquatic life. Such operations include yarding or skidding across streams, downhill high-lead logging, or crawler tractor logging. Aerial logging systems cause the least impact on aquatic life. Operations which leave excessive debris in stream channels create a high potential for mass movement of this debris during floods. Such occurrence will sometimes completely change the physical characteristics of streams and destroy their biological productivity for several years.

Transportation

Serious adverse effects on all forms of aquatic life due to road construction and maintenance were discussed under the sections on aquatic wildlife and vegetation. However, another negative impact of excessive siltation not previously discussed occurs when high levels of suspended material prevent photosynthesis in phytoplankton for prolonged periods of time. This causes a reduction in the basic productivity of the aquatic ecosystem.[78]

I. Impacts on Human Settlement and Land Use

Whereas the preceding parts of this section dealt primarily with the direct, unmitigated impacts of timber management practices on the biological and physical components of the forest community, this part and the next will include man. Consequently, the emphasis will be mostly on the impact of the timber management program in changing human values, rather than on the program's effects on the natural environment. The basic underlying assumption used in describing these impacts is that timber management will be given precedence over all other potential uses.

1. Human Settlement

Scattered throughout the Coniferous Forest Biome are many small communities and hundreds of isolated farms, ranches, vacation retreats, and mining camps. Where timber management activities are taking place near such human habitation, there are risks of adverse impacts occurring.

(a) Health and Safety

Aerial spraying of chemicals for brush and weed control, if allowed to drift and settle on inhabited areas or to enter food supplies, streams or open water, will be potentially injurious to human health and welfare. The seriousness of this potential impact will depend upon, among other things, the type of chemical used and the quantity of chemical carried to population centers by wind, water or through food supplies. Quantitative data relating injuries or deaths to forest pesticide use is lacking, thus, implying that such impacts or potential impacts are relatively minor or, until now, have been nonexistent.

Smoke from slash burning will have temporary, adverse effects on people with respiratory problems. This impact will be limited to those times of the year (usually late fall) when slash burning occurs. Their is no available, quantitiative data relative to the number of persons affected by smoke from slash burning operations; however, the effects (relative to Bureau initiated actions) are considered minor in western Oregon and negligible for the remaining forests and Alaska. Visibility willat times, be restricted where slash burning occurs near roads and highways, creating hazardous driving conditions. These conditions will also occur as a result of fugitive dust emissions from quarrying and rock-crushing activities associated with road construction, log hauling and other traffic.

Flash floods, land slides, and mudflows resulting from obstructed waterways, extensive cutting, road construction, and other causes are potentially hazardous, both on-site and off-site, to public health and safety. These possible impacts, however, are remote and quantitative data is lacking. Sedimentation of waterways could have a significant adverse impact on those communities in western Oregon whose municipal watersheds depend largely on water emanating or flowing through Bureau-administered forests.

Where logs are being hauled out of the forest, there is always the danger of collisions with motorists using the logging roads.

Hazards to the health and safety of workers will occur in nearly all phases of timber management. Accidents leading to death and injury most commonly occur during harvesting and removal operations. According to Bureau estimates, the logging industry as a whole (Oregon) suffered approximately 36 disabling injuries per 1,000,000 man hours worked in 1975. Included in this estimate are 24 logging related fatalities, a reduction of 5 from the previous year.

(b) Employment

There should not be any significant adverse effects on employment related to timber management. The frequent, often sharp, price changes in the timber industry do affect rates of employment, particularly in wood processing and manufacturing; however, this is not serious impact. Conversely, there are obvious beneficial effects on employment. Many jobs are created as a direct result of the timber management program. Other jobs, performing services for the timber-related employees, are also created. The annual timber production in western Oregon will continue to support 13,500 primary timber-related jobs (approximately 11.5 jobs per million bd. ft.) and 20,000 secondary jobs (retail trade, service, etc.) or approximately 1.5 additional jobs for each primary job. Thus, each one million board feet of timber produced from Bureau-administered lands in western Oregon supports 28.6 primary and secondary jobs. Also refer to Chapter II (k)(2). These jobs currently represent 8 percent of the total employment in the region, but range as high as 35 percent in some local areas. The annual production from the remaining forests in the contiguous United States could support some 2,000 primary and secondary jobs (approximately 650 primary and 1350 secondary). Currently, timber production from Bureau-administered lands in the remaining forests supports about 750 jobs.

(c) Local and Regional Economics

Since this is an existing program, there are no known adverse impacts on the local and regional economies. Timber production is the basis for many local economies, particularly in the Northwest Coastal Forest as described under Section K, Chapter II, Description of the Environment. Other regional economies are also benefited, though, to a considerably lesser degree.

(d) Social

Right-of-way acquisition, either through easement or condemnation, will sometimes impact adjacent landowners by opening private lands to outside use and an increased probability of vandalism. Acquisition by condemnation will have emotional impacts, primarily on those individuals whose properties are being condemned for road rights-of-ways. Potential impacts described under item 1, Health and Safety, are also social effects which will occur as a result of timber management activities.

2. Minerals Development

The proposed timber management activities will have both positive and negative impacts on mineral development. Construction of timber access roads and the clearing of timber will make potential mineral resources more accessible for exploration and developmental activities. Conversely, construction of access roads across existing mining claims may inconvenience the claimant by opening the area to outside influences and making mining operations more difficult. Timber management operations will sometimes conflict with existing exploration and mining activities.

3. Wilderness

With the exception of the Taiga Sub-Biome, few of the public commercial forest lands meet the basic criteria (established by federal legislation) necessary for classification and formal withdrawal as wilderness. Nevertheless, some public values will be jeopardized by conducting timber management practices in areas where the aesthetic values of scenery and open space might be viewed as semi-wilderness in character. An example would be the opening up of an extensive area of old-growth timber to harvesting, thereby, destroying its intrinsic virgin values. Further, timber management activities on BLM lands adjacent to established wilderness or primitive areas or areas under study for such designation will significantly detract from the wilderness or primitive experience.

The Taiga Forest contains many de facto wilderness areas which would qualify for withdrawal under federal criteria, and the impact of timber management on any of these areas will destroy their wilderness value.

4. Recreation

It is estimated that 14,000 miles of road will be constructed over the next 20 - 40 years. Of these, approximately 60% will be maintained for continued access and will be open to the public for recreational purposes.

The variety of recreational values and the broad array of timber management practices make many land use conflicts inevitable. Although some recreational activities will be benefited by timber management, others will suffer. Quite often a practice will be both beneficial and detrimental, depending upon the user's point of view. As an example, for many years following logging, a clearcut area will have lost all apparent value to a camper or hiker. However, its invasion by vegetation will produce forage for wildlife, making the clearcut attractive to hunters and berry pickers. As another example, surface runoff from a newly constructed, unstabilized forest road will cause some turbidity and sedimentation of streams with a short-term, adverse effect on fishing success and water sports. The fact remains that, as more timber access roads are constructed, more lands will be open for public recreational use, thus, creating a new land use direction that was not formerly available. These roads will provide access for hunters, berry pickers, rockhounds, birdwatchers and campers. Camping over a continuos period of time will have all the impacts to the environment associated with humans living in a primitive siutation. This will include cutting trees for firewood, lack of toilet facilities, disposal of garbage, creating trails, possible use of road vehicles and the possibility of forest fires. Alaska may be an exception to the above impacts due to a road network not being planned at this time.

Aside from these often subtle distinctions, timber management practices usually result in adverse public reaction, particularly in areas of heavy recreational pressure (usually near population centers), in situations involving unique or rare ecosystems or scenery, and where natural attributes create a high recreation potential. The recreationist's reaction may be justified in that timber management, particularly harvesting practices, will often destroy the values or uses which the public is seeking. The apparent destruction of the forest and the accompanying activities in the form of logging truck traffic, chainsaw operations, road building, etc. represent both realistic and psychological adverse impacts on recreational values. If timber management practices went unchecked throughout the forest, many of its recreational values and those on adjacent lands will be significantly impaired or destroyed. The season for pesticide application often coincides with the period of maximum recreation use, thus, creating a possible hazardous situation for the recreationists. The extension of logging road networks into previously undeveloped areas will provide greater ease of access to the recreationist, including off-road-vehicle (ORV) users.

5. Grazing

Implementation of some of the proposed practices will deny the use of federal range to some permittees and lessees temporarily or permanently.

- Area burning of a forest range after clearcutting will consume grasses and browse, thus, temporarily eliminating or reducing available livestock forage. When seeding or planting the forest after burning, it may be necessary to exclude livestock from the treated area for several years to permit the new stand of trees to develop. In certain instances an administrative decision may exclude livestock from the treatment area permanently. This is to protect young trees from the effects of browsing and soil compaction caused by livestock.

- Chemical weed and brush control will sometimes require that livestock be removed from the area to be treated prior to herbicide application. Their return will be deferred until chemicals have degraded to safe toxicity levels or, if the area treated is to be reforested, exclusion of livestock may be long-term or permanent.

- Various cutting practices (particularly clearcutting) will often create more livestock forage. However, grazing may conflict with the silvicultural objectives chosen for treated areas thereby making it necessary to exclude livestock.

- Logging roads will impair full utilization of allotted federal range or of adjacent private lands. Log-truck traffic will sometimes injure or kill domestic livestock.

Conflicts between timber management and livestock grazing will be most significant in the Montane Sub-biome. Short-term or permanent losses of forage and other impairment of livestock operations caused by timber management activities are insignificant in terms of overall meat production. However, these adverse impacts will likely be highly significant to the individual livestock producer.

6. Agriculture

Where agricultural land uses involving row crops or orchards are located near timber management activities, some adverse will occur. Aerial application of chemicals for weed and brush control will sometimes drift and settle on adjacent agricultural crops. However, the occurrence of agricultural lands adjacent to Bureau forest lands in the contiguous states is virtually nonexistent. This situation may not be true for Alaska.

Practices such as scarification, land clearing and cleaning, area burning, log skidding, and road construction can have adverse impacts on downstream agricultural lands dependent upon the forest watershed for irrigation water. Silt can fill downstream reservoirs, shortening their life, and enter and clog irrigation systems.

Clearcutting and other harvesting practices can increase available downstream water by opening the canopy. Opening the canopy permits increased accumulation of snow and reduces soil moisture losses caused by transpiration from vegetative cover.[79-82]

7. Commercial, Residential and Industrial

Adverse impacts that affect human settlement were discussed under Human Settlement. There are, however, other instances where timber management practices would adversely affect commercial, industrial, or residential land uses.

Road construction across private lands for log hauling purposes either by easement or condemnation will create nuisance-type impacts such as increased traffic, noise, dust, etc. if located near human dwellings. Furthermore, previously inaccessible private lands will likely be subjected to trespass and vandalism by the public.

Timber management operations conducted adjacent to private, residential areas or commercial developments, such as ski resorts and recreational subdivisions, will lead to conflicts because of their impact on the senses of sight, sound, and smell.

8. Local Government and Public Services

Timber management practices will have direct and indirect, adverse impacts on state and local government operations including planning. Physical disruption of public services such as gas, electric and water facilities will sometimes occur where utility rights-of-way cross timber management areas. State and county roads and bridges will be affected by increased log-truck traffic, leading to increased maintenance costs to local governments. Development of transportation systems related to timber management operations will conflict with local government plans and objectives, especially near park and recreation areas. Where roads cross or pass close to state and local government lands, the lands will be subjected to increased public use.

J. Impacts on Aesthetics and Human Interest

1. Aesthetics

With few exceptions, the impacts of timber management practices on aesthetic values are adverse. Impacts of greatest magnitude are visual; but sound, odor, and mood are also involved.

(a) Visual Impacts

There is a variety of scenic values on national resource lands. These values along with public demand for increased goods and services causes conflicts between the visual resource and the timber values. For the Bureau to maximize both, it has become necessary to inventory the visual resource and to provide measurable standards for its management.

The Bureau's Visual Resource Management inventory and evaluation system provides and incorporates the extreme variability of the land's scenic quality, the visual sensitivity level of the land and the ability of various landscapes to undergo alterations. Generally, any action that produces a visible change in the natural forest environment can cause an adverse visual impact.

Cutting practices and logging operations are attracting increasingly critical public notice. Clearcutting in particular is condemned by some groups, largely because of the visual impact caused by extensive, poorly-designed clearcut areas (Photo III-9). This is especially true where areas have been shelterwood or clearcut in geometric shapes, primarily squares, rectangles, strips, and where the characteristic landscape is rolling, undulating and natural. The striking difference created by the sale creates a marked degree of contrast to the existing landscape.

Severe visual impacts will be caused by extensive road construction operations. Significant line contrast occurs when extensive cuts and fills predominate and when the road does not blend with the surrounding landscape. In many instances, soil disturbance alone will be visually objectionable; it will also be the source of sediment which carried in surface runoff spoils the clarity and color of natural waters. Heavy log truck traffic over dirt or gravel roads will also create clouds of dust which seriously impair visibility.

Any of the timber management activities will leave such residual litter as discarded tools or equipment accessories (e.g., broken shovels, axes, wire-rope chokers and worn-out truck tires), empty fuel or herbicide containers, lunch wrappers, etc. as evidence of human presence on the land.

Other highly visible effects are prescribed burning of slash (atmospheric smoke, charred forest floor); scarification which causes disturbance of surface vegetation and soil, chemical weed and brush control (dead vegetation); and precommercial thinning (slash). Noticeable evidence of protection actions include fire lines and breaks, and the burned areas resulting from backfiring.

Consciously or subconsciously, most people have some appreciation of natural beauty. Reaction to the unsightly effects of timber management actions will vary in intensity with the individual viewer. Some of the more typical group reactions are:

- Members of a community dependent on a forest-based industry are more inclined to accept the adverse visual impacts of timber management actions.
- Hunters, fishermen, rockhounds, berry pickers, family-type campers, and off-road vehicle enthusiasts usually appreciate the easy access to the back country provided by logging road networks. This appreciation may or may not outweigh the individual's objections to unsightly conditions created by forest development and timber harvesting activities. Emotions will be mixed.
- Backpackers and wilderness advocates usually prefer the forest environment in its original condition without man-made modifications. These people may react most strongly to any unnatural change in the landscape. They often oppose proposed roads which will open back country areas to vehicular travel.

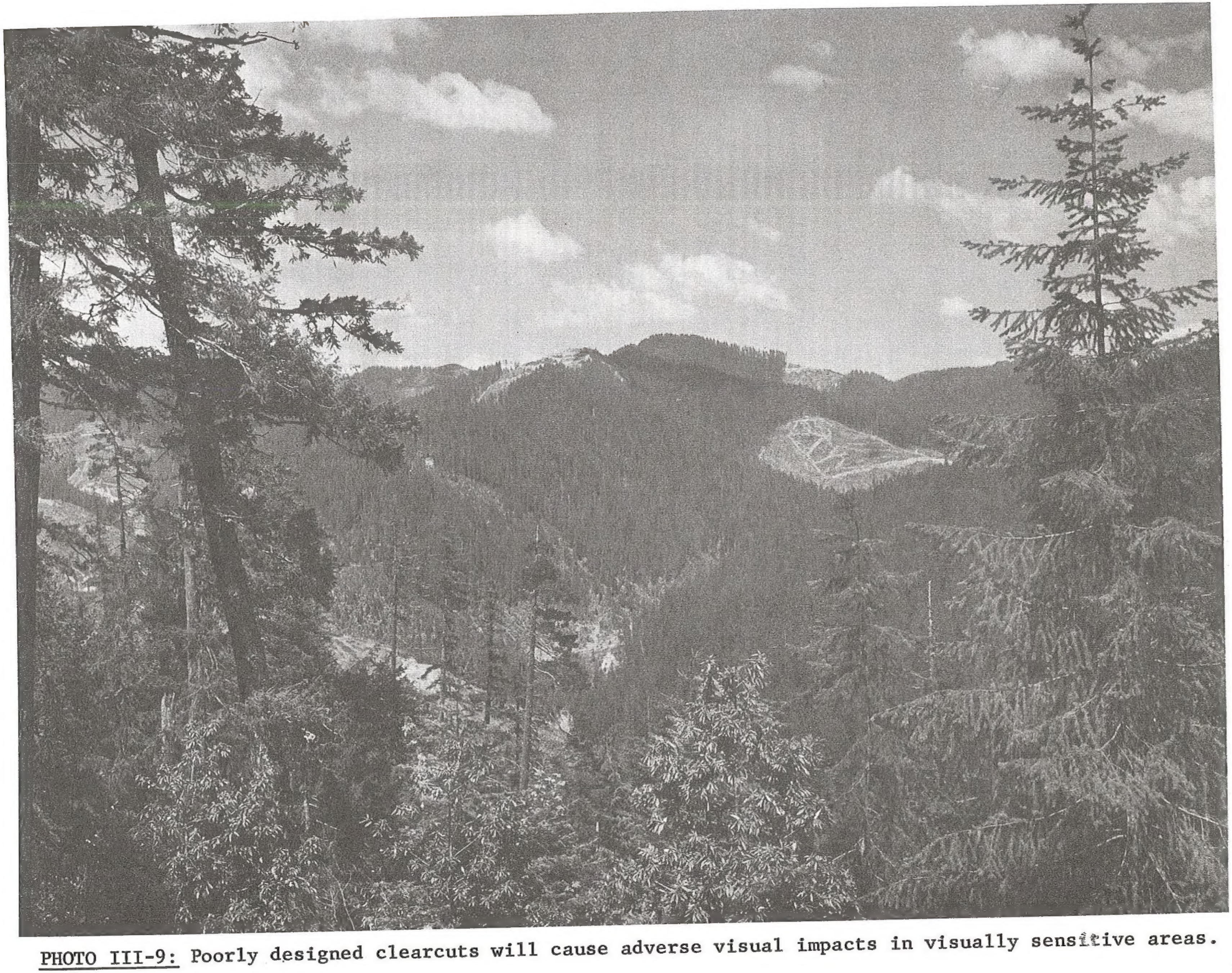

PHOTO III-9: Poorly designed clearcuts will cause adverse visual impacts in visually sensitive areas.

The adverse, visual impacts of timber production are partially offset by some incidental visual benefits. Sometimes logging road construction opens up scenic vistas which would otherwise be unappreciated. Clearcutting and vegetative erosion control measures produce forage which attracts wildlife for easy viewing by amateur naturalists.

(b) Sound, Odor, and Mood

Even gregarious campers will tend to avoid proximity to a noisy logging operation or mechanized forest development project. Certainly a hunter will normally avoid such a locale; a fisherman seeking mental relaxation will too. The diesel fumes and dust from such operations will be unpleasant to most recreationists. The combination of sound and odor or even the awareness of an odorless and soundless activity could shatter the mood of the soul-seeking wilderness advocate.

2. Geological Human Interest Values

Areas containing unique geologic structures occur in both the Montane and Northwest Coastal Coniferous Forests. While most actions related to timber management will have little if any adverse effect, road construction can have a severe impact on these natural features. Excavation of earth and rock during construction can irreparably alter natural arches and caves, ruining their visual quality.

Severe alteration of the vegetative cover, such as by clearcutting and brush removal, can also create ill effects on visually important geologic features. Sharp-edged clearcuts, especially on ridges, will have an adverse visual impact on topographic features.

3. Impact on Archeological Human Interest Values

Archeological sites and objects are most valuable to the scientist, educator, and recreationist when left undisturbed (Photo III-10 and III-11). From a scientific standpoint, archeological values are important primarily through their undisturbed relationship with other cultural or site features.

Timber-management practices can destroy or disrupt archeological sites that are on or eligible for the National Register of Historic Places, and also those that are of non-National Register significance but have recreational and other cultural values. Any action that disturbs the ground surface can have a direct impact on cultural resources and, thus, has a potential for destroying or disrupting when such actions include but are not limited to road construction, logging, and scarification. Furthermore, the construction of roads will often provide ready access to vandals and looters.

PHOTO III-10: Archeological sites and objects are most valuable to the scientist, educator, and recreationist when left undisturbed.

PHOTO III-11: Timber management activities can disrupt or destroy archeological sites and objects that are of non-National Register significance but which have recreational and other cultural values.

4. Historical Human Interest Values

Many old cabins, stagecoach rest stops, abandoned mining camps, and other historical features lie scattered throughout the coniferous forests. Remnants of old wagon trails occur in most of the coniferous forests. Severe disturbance or alteration of the vegetation near historic sites will disturb the visual setting and weaken their human interest values. Soil disturbance or alteration of the landscape by road construction and site preparation for vegetation of cutover areas can obliterate portions of old trail remnants. Road access into historic sites will subject them to vandalism.

K. Impacts of Wildfire

Wildfires do not constitute a planned action within the framework of timber management activities; and while their primary cause is lightning, their occurrence will often be directly attributable to timber management activities. These occurrences will include prescribed burning which goes out of control, faulty equipment, carelessness, and other accidental causes. Consequently, the impacts of some wildfires must be recognized as undesirable by-products of timber management.

A forest fire does a number of specific things. First, and perhaps most obviously, it consumes woody and other vegetative material (Photo III-12 and III-13). Second, it creates heat effects as a result of which living vegetation and animal life are killed or damaged and often the soil altered. Third, fire removes nutrients and produces residual mineral products that can cause chemical imbalances in the soil. A wide range and series of effects will result from these actions of fire. Some may be immediate and readily apparent, and some will be delayed and difficult to detect. Fire causes various physical, biological and chemical changes in the forest they will in turn cause a series of long-lasting imbalances in the ecosystem.

With the foregoing general description of the unmitigated impacts of wildfires on the environment as a background, no further attempt will be made to identify the specific impacts on each environmental component in this section. Since burning is used as a management tool in carrying out certain developmental practices, the unmitigated impacts, both beneficial and adverse, are described in detail in the appropriate sections of this chapter. The only distinction to be made is that quite often the magnitude of the impact is much greater in the case of wildfires when vast areas are affected. The unmitigated impacts of the on-the-ground measures employed to control and suppress fires are described under the protection phase for each environmental component.

L. Summary of Impacts

The impacts of major timber management activities on selected environmental components are summarized in Table III-2. The reader should keep in mind that the impacts shown are for general components of the environment and that individual elements of the environment (i.e., a particular species, community, etc.) will likely be impacted in a different manner or magnitude.

PHOTOS III-12 and III-13: The incidence of man-caused wildfire will be increased through expanded forest access and timber harvesting operations. This will result in tree mortality, loss of wildlife, and damage to the soil.

TABLE III-2.(Page 1 of 3)

Unmitigated Impacts of
Major Timber Management
Activities On Selected
Environmental Components

	Clearcutting and Seed Tree Cutting		Shelterwood and Commercial Thinning		Selection Cutting		Precommercial Thinning		Road Construction	
Existing Environmental Component Impact	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	−	●	−	◒	−	0	−	0	−	●
Air	−	0	−	0	−	0	−	0	−	0
Ecological Interrelationships	−	●	−	0	−	0	−	0	−	●
Recreation (general)	−	◒	−	0	−	0	−	0	−	0
Recreation (fishing)	−	◒	−	0	−	0	−	0	−	●
Recreation (hunting)	+	◒	+	0	+	0	+	0	+	◒
Soils	−	◒	−	0	−	0	−	0	−	●
Vegetation (health and vigor)	+	◒	+	◒	+	◒	+	◒	−	●
Vegetation (diversity)	+	◒	+	0	+	0	+	0	−	●
Water (quality)	−	●	−	◒	−	0	−	0	−	●
Water (yield)	+	◒	+	0	+	0	+	0	+	0
Wilderness experience	−	●	−	◒	−	◒	−	0	−	●
Wildlife (raptors, large predators)	−	●	−	◒	−	0	−	0	−	◒
Wildlife (herbivores)	+	◒	+	0	+	0	+	0	−	◒
Wildlife (aquatic)	−	●	−	0	−	0	−	0	−	●
Socio-Economic	+	●	+	◒	+	0	+	0	+	●

Legend:

Impact
− = adverse
+ = favorable

Magnitude
0 = minor
◒ = moderate
● = major
☒ = little or no impact

TABLE III-2. (Page 2 of 3)

Existing Environmental Component Impact	Tractor Logging		Hilead Logging		Skyline Logging		Ballon Logging		Slash Burning	
	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	−	●	−	●	−	◒	−	◒	−	●
Air	−	0	−	0	−	0	−	0	−	◒
Ecological Interrelationships	−	◒	−	◒	−	0	−	0	−	●
Recreation (general)	−	◒	−	◒	−	0	−	0	−	◒
Recreation (fishing)	−	◒	−	◒	−	0	−	0	−	◒
Recreation (hunting)	+	0	+	−	+	0	+	0	−	0
Soils	−	●	−	◒	−	0	−	0	−	●
Vegetation (health and vigor)	−	●	−	●	−	◒	−	◒	−	●
Vegetation (diversity)	−	●	−	●	−	◒	−	◒	−	◒
Water (quality)	−	●	−	◒	−	0	−	0	−	◒
Water (yield)	+	0	+	0	+	0	+	0	+	◒
Wilderness experience	−	●	−	◒	−	◒	−	◒	−	◒
Wildlife (raptors, lafge predators)	☒	☒	☒	☒	☒	☒	☒	☒	−	0
Wildlife (herbivores)	☒	☒	☒	☒	☒	☒	☒	☒	−	0
Wildlife (aquatic)	−	●	−	◒	−	0	−	0	−	◒
Socio-Economic	+	0	+	0	+	0	+	0	+	0

Legend:

Impact
− = adverse
+ = favorable

Magnitude
0 = minor
◒ = moderate
● = major
☒ = little or no impact

TABLE III-2.(Page 3 of 3)

Existing Environmental Component Impact	Chemical Weed Control		Chemical Hardwood and Brush Control		Chemical Baiting		Chemical Control of Insect and Disease		Fertilization	
	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	–	0	–	⊖	–	0	–	0	–	0
Air	–	0	–	0	☒		–	0	☒	
Ecological Interrelationships	–	⊖	–	⊖	–	0	–	0	–	⊖
Recreation (general)	–	0	–	0	–	0	–	0	☒	
Recreation (fishing)	–	⊖	–	⊖	–	0	–	⊖	–	⊖
Recreation (hunting)	–	0	–	⊖	–	0	–	0	–	0
Soils	–	0	–	0	–	0	–	0	+	⊖
Vegetation (health and vigor)	–	⊖	–	●	☒		+	●	+	●
Vegetation (diversity)	–	⊖	–	●	☒		☒		–	0
Water (quality)	–	⊖	–	●	–	0	–	●	–	⊖
Water (yield)	+	0	+	0	☒		☒		–	0
Wilderness experience	–	⊖	–	⊖	–	0	–	0	–	0
Wildlife (raptors, lafge predators)	–	⊖	–	⊖	–	●	–	⊖	☒	
Wildlife (herbivores)	–	●	–	●	–	0	–	⊖	+	⊖
Wildlife (aquatic)	–	⊖	–	●	–	0	–	●	–	●
Socio-Economic	+	0	+	0	+	0	+	⊖	+	⊖

Legend:

Impact
– = adverse
+ = favorable

Magnitude
0 = minor
⊖ = moderate
● = major
☒ = little or no impact

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IV. MITIGATIVE MEASURES TO BE FOLLOWED IN TIMBER MANAGEMENT

Many mitigative measures set forth in this chapter are initially brought to bear during the land use and timber management planning process as described in Chapter I. These and other measures (as may be determined through environmental assessments) are carried out in the course of planning a practice and in executing it through contract stipulations (special provisions) and contract administration. The stipulations available for inclusion in a timber sale contract are set forth in Appendix A. A sample timber sale contract is included as Appendix B. Additional provisions developed by BLM State Offices for "local" situations may also be included, as appropriate, in the timber sale contract.

As required by the National Environmental Policy Act of 1969 and subsequent guidelines published by the Council on Environmental Quality; U.S. Department of the Interior Manual 516; and Bureau of Land Management Manual 1792; the Bureau will conduct monitoring programs relative to its timber management and development activities to determine the type and degree of variance between anticipated and actual impacts of an action and to assess the effectiveness of the mitigative actions employed. Data derived through such monitoring programs will be utilized to more accurately judge the impacts of subsequent similar actions, to develop or improve mitigative measures, or to alter or change an existing action so as to provide greater protection to the environment. Monitoring programs, i.e. water quality, air quality, wildlife population changes, etc., may, as appropriate, be conducted solely by the Bureau of Land Management or in coordination and cooperation with other local/state/ federal agencies or with colleges/ universities and other appropriate institutions.

The effectiveness of all the measures described in this section is dependent upon sound planning, adequate manpower and funding, coordination with other resource activities, professional expertise, careful on-the-ground administration, and cooperation from the contractor or user. Since these requirements are common to all mitigative measures, they will not be repeated in the parts that follow.

The mitigative measures, most of which are currently followed, will be presented on a component-by-component basis, i.e., soil, water, vegetation, etc. However, since quite often the same mitigative measures apply to more than one environmental component, the emphasis in describing the measures will be placed on the most critical component impacted by the action in order to minimize redundancy.

Mitigative measures for all timber management practices shall be carried out to meet the requirements of the acts specified in Chapter I (B) and other applicable laws and regulations.

A. Ecological Interrelationships

The mitigative measures individually described for each component of the environment in this section represent, collectively, the actions to be taken in mitigating the impacts of the timber management program on the ecosystem of lands classified as available for timber production. Consequently, they will not be restated in this part. Many practices identified as part of the program are mitigative in preventing or restoring ecological imbalances or damage incurred in carrying out practices which may be disruptive to the ecosystem. These include such practices as seeding and planting, and those practices that indirectly support these restoration efforts, such as mulching and protection. Usually, the disruptive practices are those associated with the timber cutting, logging and transportation phases of the program whose mitigation is often a matter of where, when and how they are carried out.

B. Physiography, Geology and Minerals[1-4]

Forest Development

Many forest development practices are by their very nature mitigative in the sense that they decrease the potential for erosion and mass wasting. Tree improvement programs, which increase growth rates and resistance to disease, provide a means to rapidly achieve and maintain a protective canopy to preclude rain and wind erosion. Chipping adds material to the existing layer of litter and reduces the effects of raindrop splash. Seeding and planting are both effective means to provide a vegetative cover which inhibits erosion. Planting, which is the prevalent reforestation practice, is the more desirable of the two methods because the tree is already developed and provides an immediate cover. Mulching provides a protective layer around individual trees and can be used to inhibit erosive processes in the immediate vicinity of the tree.

Protection

Most practices carried out in this phase are also mitigative since they minimize or eliminate insects, disease, or fires which destroy the vegatative cover necessary for slope and soil stabilization.

Cutting Practices

Clearcutting and seed tree cutting are not to be employed on fragile areas where removal of the canopy may accelerate landslides. Fragile areas shall have cutting practices designed which are consistent with site conservation. Rock types, topographic slope, ground water conditions and geologic structures will be examined to determine if they are conduciveto mass movement for any type of cutting practice. Geologic formations, such as the Franciscan Formation of northern California, the Tyee Sandstone of western Oregon, the Bear Paw Shale of Montana, and the Colorado Shale of Colordo will be recognized along with areas covered by deeply weathered granites. In these areas of identified geologic hazards, the land will not to be subjected to commercial timber production unless such hazards can be mitigated by selecting and designing cutting practices consistent with site conservation. As a matter of policy, clearcutting will be conducted under the guidelines set forth in the March 1972, Report by the Subcommittee on Public Lands concerning Clearcutting on Federal Timber Lands, (Appendix D).

Logging Methods

Logging methods which require fewer miles of roads and trails are to be employed, to the extent feasible, in order to minimize erosion. Tractor logging will be restricted to stable slopes and favorable soil types. Tractor logging will usually be restricted to slopes less than 35% as a practical maximum except where the land consists of pitches and benches and where geologic conditions and soil types are favorable. Skidding operations are to be limited by the type of harvest operation and to the time of year when the soil is relatively dry and stable or when soils are not subject to excessive compaction.

Logging methods which would result in the least damage to the topography and surface material, in consideration of their attitude or orientation and the rock structure, are to be given first priority. Where deeply weathered pyroclastic rocks cover steep slopes, aerial systems are to be given first consideration since these types are least conducive to mass wasting.

Transportation

Hardrock formations are to be utilized to the extent feasible as road beds. Slide potential is to be lessened by selecting a location where the structural features, including joints and bedding planes, slope away from the excavation. To the extent possible, mid-slope road construction and the intersection of drainages should be avoided. Revegetation of critical cut slopes and fills is to be accomplished at the termination of construction activities.

C. Soils

Forest Development

Scarification will be conducted when the soil is dry and will be limited to the area necessary to accomplish the task. Contoured strips or patches are to be used when feasible, and all scarified areas will be revegetated as quickly as possible with desired species. Mechanical brush cutting is not to be conducted when soils are wet. Mechanical trenching-furrowing is to be conducted on the contour and the exposed soil immediately revegetated. Width should be kept to an absolute minimum, and unstable areas are to be avoided. Burning shall not take place on shallow soils or soils susceptible to erosion when conditions are such that a "hot" burn will consume the litter layer. On critical sites, a mulch is to be applied to protect the surface from erosion until vegetation is reestablished. Areas where burning would melt the permafrost are to be avoided. Trenches used for burying slash will be constructed on the contour, and the topsoil stockpiled and respread on the surface after the trench is filled.

Hand clearing and cleaning will be limited to as small an area as possible. A mulch is to be placed on the site in addition to an appropriate amount and type of fertilizer if critical soil conditions exist. Improper chemical application and chemical spills will be avoided during weed control projects and a cover of desired vegetation established as soon as possible. In precommercial thinning, care is to be exercised when fueling equipment or filling chemical injectors to prevent soil sterilization.

Protection

Fire lines are to be constructed on the contour when feasible and subsequently waterbarred and revegetated as soon as practical where critical conditions exist. Hydromulch will be applied to provide immediate protection where needed to stabilize the soil. When critical, the fire line can be ripped to loosen compacted soil. Areas burned as a result of backfiring are to be revegetated as soon as possible after the fire. In the Taiga, fire lines will be constructed in permafrost areas, to the extent feasible, by hand-trailing methods.

Cutting Practices

Clearcutting, and to a lesser degree, seed tree cutting practices will not to be employed on slopes where the potential for excessive erosion or mass wasting exists. Factors affecting slope stability which will be considered include slope gradient, thickness of the soil mantle, character of the underlying bedrock, precipitation patterns, and the inherent strength of the soil. If these factors appear to be critical,as determined by the soil scientist, other cutting practices are to be considered. When other practices such as selection, shelterwood, etc. are not feasible due to silvicultural, economic, or technical constraints or when the potential hazard remains despite the cutting system employed, the area is to be exempt from commercial timber production.

Logging Systems

Tractor logging is to be limited to slopes with gradients of less than 35% as a practical maximum except where the land consists of pitches and benches and where geologic conditions and soil types are favorable. Tractor skidding is to be avoided down or across any stream channel or across bogs, marshes, and other wet areas valuable for wildlife. Necessary crossings will be limited by number, and crossing structures will be designed to avoid adverse impacts to the streams. Tractor skidding is to be limited to those seasons and sites where soil moisture is low enough to avoid rutting, gouging or excessive compaction of the soil. Normally, it will not be necessary for operators to clear a skid road for one or two trees. Following completion of tractor logging, skid roads are to be waterbarred in order to minimize erosion. Since jammer yarding requires a closely spaced network of roads, adverse impacts can be reduced by confining these operations to existing road systems; e.g., if new roads must be constructed, alternative logging methods are to be used. In some instances, jammer yarding may be accomplished by building roads on the snow.

Landings will be located to avoid creating excessive sidecast or slope stability problems. After use, landings will be ripped or scarified to mitigate any soil compaction that may inhibit reforestation of the site. Cull logs and other unmerchantable material are not to be decked at the edges of landings in a manner that would cause slope failure.

Transportation

Road alignment and grade have important effects on roadside erosion, and effective control must begin in the design phase since the location of a road determines to a large degree the amount of erosion which may occur. The selection of the road corridor provides the opportunity to place a road in favorable relationship to topography, drainageways, soils, other natural features, and present or anticipated man-made features in order to minimize the erosion potential.

In areas of critical conditions (such as unstable terrain, important stream crossings, etc.) or as necessary the wildlife and fish biologists and soil scientists will be consulted on the route location and design. Clearing and grubbing will be conducted to minimize the area of soil disturbance and will be coordinated with grading so that the area disturbed will not be exposed longer than necessary. As in the case of most construction activities, clearing and grubbing are not to be conducted during periods of wet weather or under poor soil conditions. To minimize erosion due to excavation, roads will to be designed to a minimum width consistent with the planned use and safety. The concept of fitting the road to the topography to reduce scar and erodible areas will minimize both cuts and fills. Backslopes and fill slopes will be determined from the information gathered by the engineer or team who made the classification survey to determine the mechanical characteristics of the soils. Past experience in road construction with similar conditions of soils, slope, vegetation, rainfall, etc. may also be used. Borrow areas will be shaped to natural contours, fertilized and revegetated. Borrow pits will be drained unless suitable for pond development. If not, the topsoil is to be replaced and the area shaped, sloped, seeded, fertilized, and mulched.

Factors involved in the design of fills in embankment work are height, stability of slopes, stability of foundations, and the selection of embankment materials. All major fills (heights greater than 30-40 feet) are to be subjected to stability analyses and design in accordance with established principles of soil mechanics. Construction of major embankments will be done by placing the earth in layers and rolling to a specified density, usually in the range of from 90 to 100 percent of standard AASHO maximum density before applying the next layer. As a result, the stability or shear resistance of the soil will be increased, permeability or water entry decreased, and settlement of the embankment minimized.

During earthwork operations, bare soil will be shaped to resist erosion and minimize storm runoff. Erosion and storm runoff control methods include such devices as silt basins, sedimentation ponds, berms and temporary down-drains, swales, ditch pits, brush barriers, and other erosion control techniques. Drainage channels will be constructed early in the grading operation. Ditches will be kept cleared, culverts unplugged and drainageways open. Drainage will not be allowed to dig its own channel. In preparing the surface for surfacing, the material will be redistributed evenly, not scraped over the edge where it may erode into the established ditch. The road grade will be established at least 5 feet above the water overflow level in wet areas and other areas subject to overflow. Stablization practices will be used to correct any incipient failure of a road or slope or to remedy any erosion of a road fill, cut or slope.

The procedures for preventing erosion during stabilization efforts include soil sampling for fertility, erodibility, and texture; correlation of results with the general soils survey; formulating mixes for fertilizing, seeding, mulching, and slope dressing (generally topsoil); and provisions in design for any special problems. The desirability of topsoiling depends upon the quality of the subsoil involved and on the quantity and quality of topsoils available. Placement of topsoil over sterile subsoils will help innoculate the subsoils with microorganisms at a faster rate than under normal conditions (by dust, debris, and flowing water). Artificial mulches may be used as slope dressing over coarse or granular subsoils to help increase the moisture and nutrient-holding capacity of the soil, reduce soil-moisture loss, and reduce the erosion hazard. Equipment for seeding should be capable of broadcasting either by hydromulch or dry mulch. Where practical, a seed drill may be used. Unless specific conditions warrant, tractor-mounted, cyclone seeders are not to be used. Hand-operated, broadcast equipment can be used in small inaccessible areas.

The best time for seeding warm-season grasses is late spring and early summer, cool-season grasses in late summer or early fall, and legumes in early to mid-spring. Seeding in the semi-arid and arid regions will usually be timed to precede the period of maximum probable rainfall. Other important practices available for turf establishment are tillage and seedbed preparation and mulching.

Ditch and flume liners comprised of sod, rock, rubble, cement, asphalt, plastic or other materials are effective erosion stabilization devices. These liners will be used, where determined necessary, for immediate erosion control on ditch bottoms, on shoulder slopes, on the low side of curves, in backslope flumes, on fill slopes at culvert ends, on bridge abutment slopes, and on other areas subject to erosion by concentrated water flows.

In rock quarry development, consideration is to be given to development and reclamation plans. Where appropriate, the use of larger pits and longer hauls will be encouraged, thereby, minimizing the erosion problems.

Bases and surfaces will be constructed to prevent the entrance of excessive surface water into the base and subgrade from directly above. The base layer is to be free-draining to prevent capillary action and frost heave. During surfacing operations, oil application will be controlled to avoid stream pollution at bridge crossings, etc. Care will be exercised in selecting a site for transfer of the surfacing material from the supply tanker to the distributor truck so that oil spills will not contaminate streams.

Soil around drainage structures will be protected from erosion to insure the stability of the road structure and to prevent sediment from blocking the drainageway. Erosion in ditches can be controlled by providing a series of dams or weirs across the ditch to reduce flow velocity. These same devices will reduce sedimentation by causing suspended material to settle out. Dams and weirs can be made of concrete, stone, riprap, timber, steel or earth. Temporary checks made of straw or hay bales may also be used. Side ditch outlets which drain to natural waterways will be protected from erosion by such protective measures as a vegetated or paved sluice or chute,or other type outlet structure. Where the roadway is constructed, cut-interceptor ditches (connected to flumes) may be installed into the cut-slope face to prevent concentration of surface runoff which may cause excessive slope erosion.

Across-the-road drainage structures will be placed as nearly as possible in line with the flow direction to provide a direct entrance and exit for the intercepted water. Except where appropriate, use of short, right-angle culverts is to be avoided. Use of longer, skewed culverts will be used to follow the natural drainage pattern and will result in less maintenance cost even though initial installation costs will be higher. Energy dissipators or stilling basins will be used at culvert outlets which pose an erosion problem. Bridge sites will be adequately surveyed and investigated to insure that abutments and footings will be stable and secure. Activity in the streambed is to be kept to a minimum and performed during low-water periods or at other appropriate times as determined by the fisheries biologist. Streambanks and protective riparian vegetation are to be conserved.

The construction of roads on permanently frozen ground in the Taiga Forest could produce erosion and stability problems since the upper few feet of permafrost may thaw in the summer and become a soft, soupy quagmire. Before roads are constructed on permafrost, the permafrost will be covered with an insulating blanket to minimize thaw. Alternatively, subgrades may be placed below the active zone to avoid movement, or the soil in the active zone may be replaced with a non-frost-susceptible material such as gravel or coarse, crushed rock.

In the maintenance of roads, proper surface drainage will be retained by grading and shaping, and by patching and filling holes and other irregularities. The road surface is to be kept smooth, firm, and free from excess loose material (Photo IV-1). Stabilization methods, dust palliatives, and bituminous surface treatments will be used to minimize loss of material and to eliminate, to the extent practical and necessary, the hazards caused by dust. Surfaces will be reconditioned by scarifying and resurfacing when areas to be patched are numerous or extend over an extensive area. Bituminous surfaces may be repaired by patching, scarifying, resealing and applying a non-skid surface treatment. Care must be exercised to avoid spillage of petroleum products during refill operations. Application of the oil will be controlled to prevent soil and water contamination.

Culvert inlets will be cleared prior to the rainy season and will be kept clean to diminish the danger of clogging and the possibility of washouts. Spur roads that outslope will be cross-drained, and berms will be removed from the outside edges except those intentionally constructed to protect the road grade fills. Before spring runoff begins, all ice and snow berms will be removed. Gully erosion in waterways and ditch bottoms will be repaired by filling, shaping and lining with riprap, juted or sodded materials. Culvert ends and bridge abutment slopes which have received concentrated water flows will be stabilized and repaired. All waste materials will be deposited on stable benches or at locations well above high-water levels.

In general, bridge repairs may involve decks, railings, expansion elements and footings, bulkheads, the latter of which may require some work in the bed of a stream. As in the construction of these facilities, activities in the streams will be planned to coincide with low-water periods unless other biologic restraints dictate operation at other waterflows. Tractor and other equipment operations in the streambed will be minimized to cause the least damage to the streambed and stream banks.

Excess materials such as concrete, grout, form oil, etc. will not be disposed of in the stream. Approach-fills and banks will be stabilized to prevent erosion, and trash and debris will be removed upon completion of bridge site repairs.

PHOTO IV-1: Properly maintained forest access roads will prevent erosion and sedimentation.

PHOTO IV-2: Stabilizing backslope by hydroseeding.

Debris and slide material will be end-hauled and deposited in an area above the high-water level. Disturbed areas will be shaped, tilled and seeded with deep-rooted legumes and grasses to hold the soil in place. Fertilizer and mulch may also be used to help stabilize the area. Gravel drains will be installed between topsoil and subsoil layers, where necessary, to relieve water pressure and seepage.

Herbicides used for controlling brush along roads will be handled with care to avoid chemical drift and spillage which could contaminate streams. Only herbicides on the approved Department of Interior list will be used. Herbicides are considered pesticides, and the mitigative measures discussed in the next section on Water apply to herbicides. Mechanical brush cutters can be used in combination with chemical applications.

Erosion repair methods are comparable to measures taken in preventing erosion in the construction phase; however, variations do exist. Straw or hay may be disc-anchored or tacked with asphalt. Hydromulch (wood cellulose or fiber pulp) is to be used on high steep slopes, rock overburden areas, or areas where the wood pulp is needed to "plaster" the seed and fertilizer in place. The cellulose fiber can be applied with a hydroseeder along with seed and fertilizer as shown in (Photo IV-2). A wood excelsior blanket is recommended on slopes steeper than 2½ to 1 and longer than 25 feet. A blanket is to be used for establishing alfalfa and crown-vetch on difficult slopes and in the repairing of some gullies. Riprap (usually field stone) will be used, where necessary, for erosion control in culvert scour-holes, on shoreline slopes to protect them from wave action, and in lining of waterways and channels. Soil compaction and surface disturbance are to be minimized by operating stablization equipment during favorable weather and soil conditions. Any temporary roads or trails are to be waterbarred and, if conditions warrant, seeded to vegetative species as soon as possible following their period of use.

D. Water

State water quality standards will be goals in the course of carrying out any timber management practice. Water quality monitoring will be undertaken, where needed, by the Bureau and other federal, state or county agencies.

Forest Development

The impact of area burning on water quality is to be reduced by minimizing, as determined necessary, the temperature of the burn and by reducing overland flow of water from the burned area to stream channels. The temperature of the burn is to be reduced by dispersing the fuel and/or by burning under conditions (e.g., following a rain shower) which preclude high ground temperatures. Overland flow of water from the burned areas will be reduced, as determined necessary, by (1) constructing fire lines in critical locations and which avoid steep gradients or the sidecasting of large amounts of soil, (2) revegetating fire lines, and constructing waterbars and/or diversion channels.[5] Filter strips of undisturbed vegetation below the burned area will not be removed. This will inhibit the movement of suspended solids with the surface runoff.[6] The width of these filter strips will vary with soil and slope characteristics.

The adverse effects of scarification on water quality will be reduced by: (1) keeping machinery out of stream channels, including perennial streams and those that carry water during seasons of high runoff; (2) avoiding areas where slope instability will be increased by the removal of shrubs, stumps and roots; (3) avoiding the disruption of the normal runoff pattern; and (4) by scarifying along contours. Sufficient plant life and plant debris will be retained to protect the soil from raindrop impact. Areas having shallow soil mantles (20" or less) are to be avoided. Soils which have a high potential for compaction are to be excluded from scarification activities. Coarse-textured soils are to be scarified during seasons when the soil moisture is low to reduce the potential for soil compaction. Heavy equipment is not to be operated in areas having high soil moisture content to avoid gouging and rutting.

Practices that involve the use of pesticides shall be carried out in accordance with the Federal Envirnomental Pesticide Control Act of 1972 and applicable state laws. The Bureau will prepare an environmental analysis record or, where determined necessary, an environmental impact statement on each pesticide project. Further, all proposed pesticide projects will be reviewed by the Bureau's Technical Pesticide Screening Committee and by the Federal Working Group on Pest Management for their approval or rejection. Chemical pesticides shall not be used when non-chemical or integrated chemical and non-chemical techniques offer a practical and reasonable alternative option. No pesticides will be used where there is a basis for belief that water quality will be degraded; or hazards exist that will unnecessarily threaten fish and wildlife, their food chains, or other components of the environment. At this time, the following pesticides are on the United States Department of the Interior prohibited list and are not to be used: aldrin, amitrol, arsenical compounds (inorganic), azordrin, bidrin, DDT, DDD(TDE), 2,4,5,-T, dieldrin, endrin, heptachlor, lindane, mercurial compounds, strobane, thallium sulfate, and toxaphene.

In baiting and weed and brush control practices employing chemicals, the proper combination of chemical, carrier, method of application (ground or aerial), droplet size for spray applications, and width of streamside buffer strip are to be carefully evaluated to minimize the probability of accidental movement of pesticides into streams, lakes, marshes, and estuaries. Air stability is essential for aerial applications, and spraying operations are to be discontinued immediately if it appears that significant lateral drift may occur. Mixing methods and areas used for mixing, storage, loading of chemicals, and cleaning of equipment are to be carefully selected to minimize the chance of leakage of chemicals into streams, lakes, reservoirs, marshes and estuaries. Whenever possible, pesticide containers should, after thorough rinsing, be returned to the supplier or to a firm properly equipped for reclaiming or reconditioning pesticide containers. If these methods are not available, it will be necessary to dispose of these containers through delivery to collection sites operated by the community or proper burial at landfills approved by the State Departments of Health, Natural Resources and Agriculture, or by burial on privately owned premises dedicated to this purpose. Monitoring of streams and other bodies of water in the vicinity of the project is to be conducted during the operation. This includes follow-up monitoring to assure safe application of the chemical.[7]

The adverse impacts of forest fertilization on water quality will be reduced by using the same precaution used in applying pesticides; e.g., the use of streamside buffer strips and precautions in storing, loading and applying the fertilizer will be essential in project planning and implementation.

Protection

The mitigative measures that apply to chemical, weed and brush control also apply to the use of insecticides, fungicides and fire retardants. The mitigative measures employed in area burning, as described earlier, also apply to backfiring. Additionally, the edge of a stream or lake will not be used to backstop a backfire, except in unusual or emergency situations.

The impact of fire line construction on water quality will be reduced by minimizing the surface disturbance and by applying erosion control measures following control of the fire. More specifically, adverse impacts of fire line construction are to mitigated by:

- Avoiding fire line construction if control can be achieved by direct attack. Slow-moving ground fires can often be suppressed by smothering with dirt or by direct application of water.

- Building fire lines to minimum widths necessary, including a realistic safety margin. Where appropriate, fire lines should be constructed using handtools and hand labor to prevent overbuilding by machines.

- Building fire lines along the contour where possible. Steep gradients should be avoided.

- Applying erosion control measures wherever necessary to inhibit excessive surface runoff and the transportation of sediment and debris to streams, lakes or other water bodies. Specifically, waterbars and check-dams are to be installed on fire trails to divert surface runoff and to reduce its velocity.

- Revegetating the burned area with suitable plant species. Revegetation will be accomplished, as determined necessary and practical, immediately following suppression of the fire.

Cutting Practices

Control of sediment from soil erosion can be most effective when all factors in the silviculture and harvest system are systematically planned with soil and water management to prevent soil erosion.[55]

The adverse effects of clearcutting and seed tree cutting will be mitigated by:

- Providing streamside buffer strips of adequate width and density to reduce or eliminate sediment-laden overland flow of water from reaching stream channels (Photo IV-3). All perennial streams, all intermittent streams with fisheries values, and other important streams are to have buffer strips. Buffer strips are to contain sufficient trees and/or shrubs to provide shade for the stream and protection for the stream bank. The width of the buffer strip, necessary to meet these objectives, will consider the slope of the ground into the stream channel; topographic shading; vegetation height, density, and species; stream characteristics (width, depth, and flow velocity); and the erodibility of the soil. Generally, buffer strips from 50 feet to 200 feet will provide sufficient stream protection. These widths, however, may be narrower or wider depending upon the variables or combination of variables previously indicated.

- Using other harvesting practices based on critical slope conditions. Factors to be considered are the effect of the loss of root strength on soil stability, slope gradient, thickness of the soil mantle, character of the underlying bedrock (smooth, fractured, etc.), precipitation patterns including the frequency of intense rainstorms, seasonally high ground-water levels, and the inherent strength of the soil.[8]

Logging slash, cull trees, stumps and other logging debris will be disposed of properly. Observations in western Oregon and Alaska have shown that logging slash left in steep, ephemeral stream channels contributes to the potential for destructive debris avalanches in these channels when soils become saturated during the winter season.[9] It is important that debris be removed from stream channels concurrent with logging operations.

Logging Systems

Falling timber upslope or along the contour of steep slopes will usually prevent felled trees from sliding downhill into or through streamside buffer strips. Trees selectively cut adjacent to natural waters are to be felled away from the water. Logging slash and debris which enter stream channels or lakes unavoidably during falling operations are to be promptly removed.

Tractor logging is to be limited to slopes with gradients of less than 35% as a practical maximum except where the land consists of short pitches and benches and where geologic and other conditions are favorable. Yarding across or down stream channels will be avoided. Tractor skidding is to be limited to those seasons and sites where soil moisture is low enough to avoid rutting or gouging of the soil. Usually, operators will not be permitted to clear a skid road for one or two trees where this practice may result in an area being crisscrossed with excessive skid roads. Following completion of tractor logging, skid roads are to be waterbarred to minimize erosion.

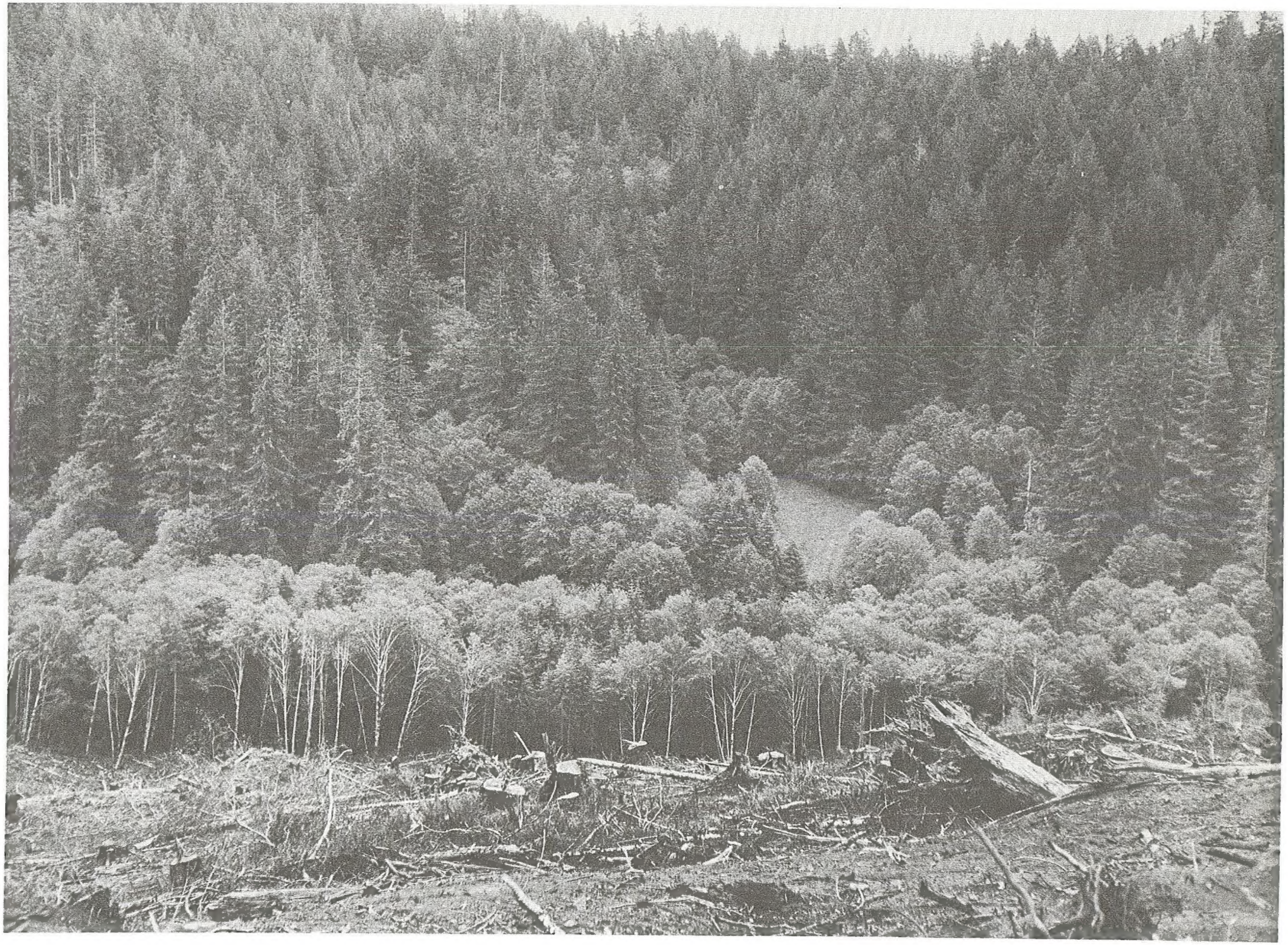

PHOTO IV-3: Hardwoods (foreground) have been retained as a buffer strip to protect stream.

Since jammer yarding requires a closely spaced network of parallel roads, adverse impacts are to be minimized by confining jammer operations to existing road systems. In some instances jammer yarding can be accomplished with relatively little soil disturbance by building the roads on the snow.

Aerial yarding systems are to be used wherever feasible to minimize damage to the watershed. Since aerial systems often operate more efficiently with road networks differing from those which best serve conventional logging systems, road location must be coordinated with the aerial logging plan.

On sites with slope stability problems, landings are to be designed and located to assure that the landing will not be overconstructed, that site productivity will not be impaired or reduced by excessive sidecast, and that slope stability problems will not be created. In constructing landings, excavated material will be firmly compacted in fills if compaction is essential for slope stability. Excess excavated material will be endhauled to safe disposal sites, where necessary, to avoid long, sidecast fills on steep slopes.

Transportation

Adverse impacts of road construction will be mitigated by:

- Roads will be designed to minimum standards consistent with the proposed use and traffic safety. The concept of fitting the road to the topography will reduce scar and erodible areas and will minimize cuts and fills. Where it is necessary to traverse short sections of unstable terrain, remedial measures (riprap, extra drainage, etc.) are to be included in the road design. In areas of critical conditions such as steep slopes, unstable terrain, stream crossings, etc., the wildlife and fish biologists and the soil scientists should be consulted in the route location and design. Care is to be exercised in protecting stream channels and banks by the use of streamside buffer strips wherever possible. In the case of roads which approach stream crossings in narrow V-shaped canyons, the right-of-way clearing width below the road may be reduced to provide a vegetative strip for stream protection. Stream crossings will be limited to the minimum practical width, consistent with good safety standards. The stream channel will not be used as a disposal site for excavated material originating from other portions of the road.

- Excavated material will be endhauled to avoid long, sidecast fills on steep terrain. Disposal sites for endhauled material will be selected to avoid overloading slopes, thus, to avoid slope failures. Fills will be compacted where this practice contributes to slope stability and will prevent road failure.

- Culverts will be installed at frequent intervals to assure that the road subgrade will remain dry and stable. Drainage from culverts will not be discharged onto unprotected fills. Aprons may also be installed on fills under culvert outfalls. Downspouts (Photo IV-4) or other suitable conductors will be used to divert or transport culvert drainage away from the fill or to dissipate the kinetic energy of this water.

- Bridges and culverts shall be installed during periods when streamflows provide optimum conditions for completing the work and for preventing water quality degradation. Operation of equipment in the stream channel will be minimized.

- Stabilization (seeding, mulching, riprap, etc.) practices will be employed to correct potential road or slope failures or to correct eroded road-fills, road-cuts, or slopes. Temporary roads and trails will be waterbarred and put-to-bed to minimize soil erosion and possible stream sedimentation.

E. Air and Microclimate

Forest Development

Smoke from area or spot burning is to be minimized by integrating burning schedules with weather reports to produce (as practical) a rapid and hot combustion of materials.[10] Weather conditions will also be used to control smoke, especially in sensitive areas. Federal and state air quality standards will be met in conducting prescribed burning activities. Burying and chipping of slash will be used when feasible to reduce the volume of fuel and, thus, to reduce the need for burning. Photo IV-5 depicts chipping operation used to reduce hazard from thinning-slash.

In many situations, prescribed burning or brush removal is essential, and the impact on microclimates may be non-existent or insignificant. If significant adverse impacts are anticipated, however, the following mitigative measures will be employed:

- Areas to be treated will be kept small. The trend toward smaller clearcuts favors this mitigative measure, particularly with area burning. The beneficial effects of partial brush cover can be retained, where desired, by spot removal rather than by area treatment of brush.

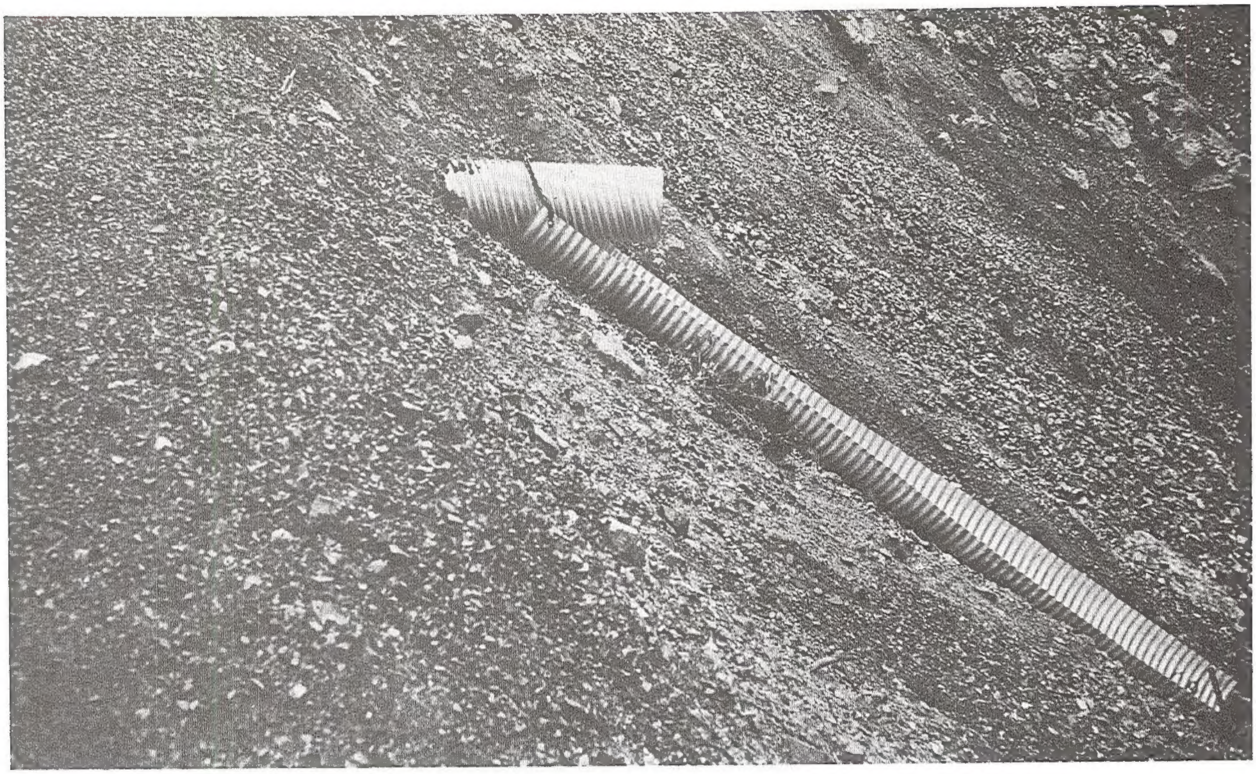

PHOTO IV-4: Downspouts are used to divert water from the fill slope to natural drainage channels or to solid ground.

PHOTO IV-5: Chipping slash reduces hazards of wildfire and insect infestation.

- Light burning, if a light burn will achieve silvicultural objectives. It will be accomplished during a period when burning conditions favor an easily controlled fire of low intensity. Fire equipment and manpower will be placed on standby status for emergency use in the event burning conditions be change or the fire escapes. When necessary, a fire trail will be constructed around the project area prior to treatment.

Protection

The adverse impacts of backfiring on microclimates will be mitigated by:

- Keeping the backfired area as small as feasible, consistent with the objective of controlling the wildfire.
- Backfiring, if possible, when burning conditions favor easy control.
- Safeguarding the backfire by burning from a road, fire trail or natural barrier.
- Maintaining adequate manpower and equipment on standby.
- Revegetating the burned area with suitable species as soon as possible.

Cutting Practices - Logging Systems

Where a site is dry and exposed to solar radiation and drying winds, cutting practices which provide shade to reduce surface soil temperatures and evaporation are to be used. In forests susceptible to windthrow,* clearcuts will be designed to fit the topography so that strong winds will have a minimum effect on the edges of the reserve stand exposed by harvesting. No mitigation is necessary for the minor adverse effects of logging operations on micro-climate.

Transportation

The effect of right-of-way clearing on the microclimate will be reduced by minimizing the width of clearing, consistent with good safety practices. Fugitive dust emissions from road construction will be reduced, as necessary,to meet local air pollution standards by watering road surfaces during blading and surfacing operations. Dust created by log hauling can be abated by oiling the roads or by surfacing them with bituminous or macadam materials. On roads with dirt or gravel surfaces, periodic applications of water or waste sulfite liquor will be used as necessary to control fugitive dust.

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* Susceptibility to windthrow depends upon tree species, soils and soil depth, topography, rainfall intensity and distribution, prevailing wind direction and speed,and other climatic conditions, particularly the occurrence of unusual or severe storms.

F. Vegetation

1. Terrestrial Vegetation

To avoid redundancy in the following discussion, it should be noted that, as a standard mitigative practice, areas denuded of vegetation by timber management operations will be artifically revegetated where determined necessary, i.e., when natural revegetation will proceed so slowly (more than 5 years) that unacceptable adverse impacts are possible. Such artificial regeneration will employ suitable native plant species or introduced species that will be compatible with adjoining plant communities and with program objectives.

To insure protection of threatened and endangered plant species, no action may proceed until an environmental assessment has been prepared and an appropriate investigation of threatened and endangered plant life has been made. This investigation will include consultation with the list of threatened or endangered fauna published in the Federal Register and consultation with the Smithsonian Report (revised) on threatened and endangered plant life. The responsible field official should also insure that appropriate contact and consultation is made with individuals (i.e. botonists), colleges, universities, organizations and other institutions recognized for their expertise or work in indentification, evaluation, and protection of threatened or endangered plant life. Where candidate species are identified or suspected or as otherwise determined necessary by Sec. 7 of the Endangered Species Act of 1973 (P. L. 93-205), consultation with the U.S. Fish and Wildlife Service will be established to insure that the existence of threatened and endangered species or the destruction or modification of their habitat is not jeopordized.

Forest Development

Mitigation of adverse, short-term impacts to vegetation caused by forest development practices such as scarification in strips or patches, mechanical furrowing or trenching, spot burning, hand application of herbicides around individual trees, mulching, and hand clearing and cleaning will be accomplished by confining these activities to small areas.

Long-term impacts associated with forest development actions such as scarification, area burning, and aerial spraying of herbicides are to be mitigated by insuring that such actions result in environmental conditions which favor reforestation of the site. This will require: (1) an appraisal of environmental conditions on the site prior to the action and, (2) a basis for predicting environmental consequences if the action is implemented. These requirements are to be met by: (1) classifying the forest land according to plant associations,[11] or by habitat types,[12] and by forest soils;[13] and (2) by applying appropriate forest development actions to selected classifications and then monitor the results.[14] Reforestation surveys will be conducted during the first and third years following planting. Subsequent followup surveys will be made where determined necessary. Adverse, long-term impacts of increased susceptibility of trees to insect and disease infestations caused by tree improvement practices will be avoided by adhering to statistical and genetic guidelines relative to numbers of trees selected per breeding unit.[15]

Protection

The short-term impact of fire line construction and backfiring will be mitigated by minimizing vegetative disturbance. Burned areas and areas accidentally exposed to chemicals will be rehabilitated by revegetating them. Many of the practices associated with insect, disease and fire control are mitigative since they are primarily directed at maintaining the health and vigor of the forest.

Cutting Practices

Mitigation of long-term, adverse impacts resulting from timber harvest practices primarily involves the use of proper cutting practices to insure environmental conditions that favor reforestation. Like forest development, land classification and a predictive system are required to insure satisfactory results. In the absence of such information, however, long-term, adverse impacts will be mitigated by: (1) confining clearcutting and seed tree cutting to forest sites which will, as based on prior experience, reforest artifically or naturally within two to three years following the final harvest (e.g., cool-moist sites in the Northwest Coastal Sub-biome and Douglas-fir and Western Hemlock zones of the Montane Sub-biome); (2) restricting size of clearcut and seed tree areas to approximately 40 acres or less; and (3) using selection or shelterwood cutting methods on such areas as warm-dry sites in all vegetative zones and on high-elevation, true-fir sites. *Periodic surveys of cutover areas will be conducted to determine regeneration success. Followup reforestation treatments will be employed, as determined necessary, to insure adequate stocking of the site.

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* Stocking surveys are conducted at one, three and five-year intervals following planting.

Windthrown trees in stands harvested by seed tree or shelterwood methods will be removed, as time and conditions permit, to avoid concentrations of dead material and, consequently, opportunities for the growth of damaging insects and disease. These same measures will be employed around clearcuts where the fringes of the residual or adjacent stand(s) are exposed to the elements. Removal of the downed trees will also reduce the risk of fire and will permit the salvage of merchantable lumber.

Logging Systems

Adverse, short-term impacts to vegetation caused by logging operations will be mitigated by using logging systems that minimize the disturbance to the understory, shrub, and herbaceous vegetation. Such systems include skyline, balloon and helicopter yarding. However, mitigation of long-term, adverse impacts caused by logging methods, like development and cutting practices, must insure that environmental conditions following harvesting favor reforestation. Land classification and a predictive system are also required to insure satisfactory results. In the absence of such information, however, long-term impacts are to be mitigated by employing logging systems that disturb herbaceous and shrub layers whenever: (1) such vegetative layers are well developed and contain insufficient numbers of young trees; (2) the destruction of vegetal material by scarification, burning, etc. is impractical due to steep topography, excessive fire hazard, etc. and (3) excessive soil compaction or erosion will not occur. Such systems include tractor and high-lead yarding.

Where skyline, balloon, and helicopter yarding systems are used and vegetative disturbance is insufficient to permit adequate reforestation of the site, scarification, area burning, mechanical brush cutting and aerial application of herbicides will be used to reduce the vegetative competition and to encourage regeneration. Where these forest development practices would cause adverse impacts to the site, other development actions such as hand clearing and cleaning, hand application of herbicides, and use of shade-tolerant species will be considered in reforestation efforts.

Transportation

In general, both short-term and long-term, adverse impacts caused by road construction will be mitigated by locating and designing the roads to fit the topography. These procedures will reduce scar, limit sidecasting, and minimize the area exposed to wind and water. The measures used to mitigate impacts to soil will also be applicable in mitigating adverse impacts caused by road construction on vegetation.

2. Riparian and Aquatic Vegetation[16-21]

Forest Development

Adverse impacts caused by forest development actions such as mechanical brush cutting, area burning, snag felling, and chemical application of pesticides will be minimized by leaving untreated buffer strips between the treated areas and the stream bank. The width of the buffer strip will vary depending upon the practice employed in order to preclude the entry of soil, organic matter, or toxicants into the water and to protect existing riparian vegetation. Streambed buffer strip widths of 100, 50, 25, and 15 feet are recommended for the application of herbicides by aerial, ground vehicle, hand spraying, and hand injection methods respectively.[55] These widths, however, will vary depending upon site conditions and characteristics. Algae blooms or growth of undesirable plants in lakes or ponds caused by the accidental drift of fertilizer will be controlled, where appropriate, by use of herbicides.

Protection

Adverse impacts of protection practices are to be minimized by insuring that insecticides and other chemicals are confined to the target area. All reasonable and practical means to minimize chemical drift and to guard against accidental spills will be employed. When feasible, bodies of water will not to be used as fire lines. The impacts caused by fire line construction will be reduced by constructing them on the contour and away from streams or lakes when feasible.

Cutting Practices - Logging Systems

Adverse impacts of cutting practices and logging operations on riparian vegetation and aquatic plants are to be mitigated by use of buffer strips between the cutting areas and streams, lakes or designated bogs, marshes and other wet areas. Trees, slash or large debris will be removed from the water body. If logs must be yarded across important perennial and intermittent streams, logging systems (e.g., skyline, balloon, or helicopter yarding) capable of suspending logs above the buffer strips will be used. Use of these yarding systems on steep slopes and erodible soils will also minimize the impact of siltation on aquatic vegetation.

Transportation

Adverse impacts of road construction on riparian vegetation and aquatic plants will be mitigated by retaining a buffer strip between roads and streams. The width of the buffer strip will vary depending upon slope, soil type, stream characteristics and the nature of the vegetative cover. As previously indicated, buffer strips of 50 to 200 feet generally provide sufficient protection for the stream. Other effective mitigative measures will include, as appropriate: (1) location of the road away from the aquatic habitat or areas of unstable soils, (2) engineering roads to minimize sidecasting, (3) waterbarring unsurfaced (dirt) roads, and (4) stabilizing cuts, fills and areas around culverts by seeding herbaceous vegetation.

Adverse impacts from road maintenance actions will be mitigated by: (1) hauling soil and debris caused by landslides to suitable disposal sites and (2) leaving effective buffer strips between roadside chemical brush control areas and the aquatic environment.

G. Animals

1. Terrestrial Wildlife[22-26]

Forest Development

Loss of habitat, caused by forest development practices that accelerate the growth of conifers, will be reduced by regulating the stand spacing, size of cutting, and age of the cutting units to maintain a variety and mixture of age classes.

To mitigate adverse impacts of scarification, mechanical brush cutting, burning and chemical weed control, vegetative destruction will be restricted to small areas to permit wildlife to move to adjacent available habitat. Brush removal work and high brush control must be coordinated with the wildlife biologist, especially on big game winter ranges, calving and fawning sites. While regulations prohibit the general use of poisons such as endrin and "1080" for rodent baiting and tree seed treatment, clearance has been received for the use of strychnine treated blocks for porcupine control. These salt blocks may be placed in specially designed bait stations consisting of a segment of half-round culvert with partially closed ends. Bait station sites will be selected near porcupine activity and will be anchored in place to avoid being kicked or knocked over by large animals. The strychnine will be securely fastened inside the station about mid-way up the side. This positioning will assist in preventing poisoning of non-target species such as mice, rabbits and birds. Strychnine salt blocks may also be placed in wooden boxes hung in trees. This method protects ground- dwelling animals from the poison.

Gopher control is generally achieved by using 0.5% strychnine- treated wheat used at about one (1) pound per acre. The poisoned wheat is placed in gopher mounds, or runs, to prevent poisoning of non-target species. One (1) percent zinc phosphide treated wheat may also be applied in a similar manner to control mice. Neither zinc phosphide nor 0.5% strychnine pose secondary poisoning threats.[56] (Refer to Chapter IV (D), mitigating impacts on Water for further information on pesticide use.)

Adverse impacts of baiting can be avoided by using alternative measures such as fencing and screening to protect conifers from seed and seedling-destroying animals. As a result of current research projects designed to (1) find a chemical seed protectant as an alternative to endrin, and (2) protect tree seed by masking its odor, the use of poisons may become unnecessary in the future.

Adverse impacts of fencing will be mitigated by constructing enclosures to preclude the entry and entrapment of deer and elk; animals will be less likely to enter small enclosures.

Fencing will not be used where it will significantly interfere with big game migration routes, calving or fawning areas. All fencing will be constructed in accordance with Bureau Manual 1737. Since antlered animals are easily entangled and killed in nylon mesh, this type of fence material will not be used.

Mitigation of adverse impacts caused by snag felling will be accomplished by reserving snags of high quality for wildlife use in selected locations. All cavity-bearing trees are to be reserved where practical. Eagle and osprey nest-tree preservations sites will also include adjacent perch trees which may be used by both young and adult birds. Preservation of snags and other suitable trees used by threatened or endangered wildlife is to receive highest consideration. Where important snags or dead trees cannot be saved, live trees may be girdled to provide wildlife benefits. Adverse impacts of precommercial thinning and pruning on wildlife will be mitigated by restricting these activities to those periods when human activity on the site will have the least impact and will not preclude or unduly disrupt mating and wintering activities.

Protection

Adverse impacts caused by protection practices will be minimized by insuring that insecticides and other chemicals are confined to the target area; e.g., all practical and reasonable methods will be used to minimize drift and guard against accidental spills. Before control projects for insects and disease are initiated, a rigorous analysis of possible impacts to non-target species will be made.

Cutting Practices

To avoid adverse impacts to the greatest number of wildlife species, clearcutting will usually be confined to small scattered tracts ranging from 15 to 40 acres in size and designed to produce the greatest "edge" effect. To avoid the short-term impacts of harvesting on areas identified as having special nesting or wintering values, falling and bucking, and yarding activities will not be done, to the extent feasible, during the nesting season or during months of severe winter weather. Where appropriate, cutting will be prohibited or highly selective around critical wildlife areas such as meadows, bogs, and calving grounds. Buffer strips will be planned for areas around wildlife nesting areas, especially those of threatened or endangered raptors. Timber cutting in these areas is to be done after nesting has been completed. Consideration will also be given to the designation of official critical habitat areas around nests and other vital habitat pursuant to Section 7 of the Endangered Species Act of 1973. Individual trees, valuable for cavity-nesting birds or as perch trees for birds of prey, will not be felled.

Logging Systems

In critical, food-shortage areas denuded of vegetation caused by tractor, high-lead, or other ground-yarding systems, the area may be seeded to grass-legume-browse species best suited to a variety of wildlife. Current knowledge and seed availability will limit the value of this seeding to wildlife.

Logging methods will be altered where necessary to protect key wildlife habitat areas.

Transportation

Adverse impacts of transportation on terrestrial wildlife are to be mitigated by:

- Minimizing the amount of land removed from production due to the construction of roads, trails and landings.
- Avoiding road use or road construction during the nesting or critical need seasons.
- Avoiding big-game winter ranges or closing of roads to travel during winter or critical need seasons.
- Closing and revegetating spur roads which are no longer necessary for timber management.
- Leaving vegetal screening for wildlife along main roads in cutting areas.
- Keeping rights-of-ways along paved roads clear of vegetation to minimize road-kills, using unpalatable vegetative species for roadside stabilization projects and posting signs warning motorists of wildlife crossings.
- Locating and engineering roads to avoid sidcasting soil, rock and debris, etc. onto steep slopes.

- Designing backslopes and fill slopes to permit easy, unrestricted animal movement across the roads.

- Where appropriate, designing underpass and overhead passage facilities into road systems that bisect migration corridors of big game animals.

2. Aquatic Wildlife[27-52]

Forest Development

Adverse impacts caused by heavy equipment used in scarification and mechanical brush cutting will be mitigated by: (1) confining use to conditions that preclude soil compaction and erosion, e.g., gentle slopes with deep, non-erodible, dry, soils; (2) using effective vegetative buffer strips between treated areas and streams; (3) waterbarring and revegetating spur roads constructed during forest development operations; and (4) preventing machinery from crossing streams except on bridges or culverts or at other designated crossings.

Adverse impacts of chemical weed control will be mitigated by avoiding direct application to standing or flowing water. This will be accomplished by establishing vegetative buffer strips between streams and the treated area, especially where aerial applications are used. The width of the buffer strips will vary with the method of application; however, buffer areas are to provide sufficient protection to insure that chemicals do not enter the streams, lakes or other water bodies. Accidental spillage or discharge of pesticides into streams will be minimized by selecting safe routes for transport vehicles and safe aircraft loading points. Impacts are also to be reduced by confining chemical application to the target area and preventing drift of spray onto adjacent areas. Drift of chemicals is to be minimized by spraying during stable air conditions and by using (1) helicopters instead of fixed-wing aircraft, (2) by using invert emulsions (where technically feasible) in lieu of "conventional" methods, and (3) by using spray orifices that produce droplets least likely to drift. (Refer to Chapter IV(C), Soils, for further information on pesticide use.)

Adverse impacts caused by fertilization will be mitigated by avoiding their direct application to bodies of water. This will be accomplished by using buffer strips.

Buffer strips between streams and burned areas will be used to reduce the impact of area burning on aquatic wildlife. Additionally, area burning will be confined to gentle slopes and to soils that resist erosion. Spot burning or chipping of slash will be used, where practical, in lieu of area burning. These methods will not be employed near streams except behind vegetative buffer strips to prevent impacts to the aquatic habitat.

Adverse impacts of baiting and seeding (where seeds are treated with toxic chemical repellants) will be mitigated by: (1) selecting chemicals least toxic to aquatic wildlife, including insects; (2) avoiding application over water; (3) using hand application methods, where possible; (4) using helicopters instead of fixed-wing aircraft if aerial application is essential; and (5) using a vegetative buffer zone between the aquatic habitat and the treated area.

Fencing across streams supporting fish populations will be avoided to preclude blockage by drifting debris. Snag felling in buffer areas will not be permitted except in unusual situations. Then, snags must be felled away from streams. Thinning or pruning will be avoided adjacent to streams.

Protection

Where insecticides are to be used, mitigative measures will include selection of an insecticide and a rate of application least toxic to aquatic wildlife, including insects; use of buffer zones between the aquatic habitat and the treated area; and confinement of the chemical to the project area by using helicopters and application of the chemicals when air is calm. Where feasible, pilots familiar with the project area will be used. The latest technology in producing spray droplets which resist drift, caused by wind, will be an integral part of the operation. Transportation routes and loading sites will be selected to preclude spillage of insecticides into aquatic habitats.

Precautionary measures similar to those used for insecticide and chemical weed control applications will be used to mitigate impacts caused by fire retardants. (Refer to Chapter IV(C), Soils, for further information on pesticide use.)

Cutting Practices

To minimize impacts on aquatic wildlife, the cutting practices that are least destructive to terrestrial vegetation and soil are to be considered; e.g., selection cutting should be considered first, followed by shelterwood, seed tree and clearcutting in that order. Regardless of the cutting practice used, adverse impacts are to be mitigated by retaining, as appropriate, vegetative buffer strips between the aquatic habitat and harvest area. This will maintain suitable stream temperature, protect streams from sediment, protect existing stream banks from erosion and retain the bottom characteristics of the stream. Trees are not to be felled into streams unless the trees are to be used for stream habitat improvement.

Logging Systems

To mitigate adverse impacts, the logging system least destructive to a specific site is to be given first priority. Aerial methods such as skyline, balloon or helicopter yarding will be used where conditions permit. A wide buffer zone along the aquatic habitat will assist in preventing up-slope trees from entering the stream during the falling operations. Those trees nearest the buffer area are to be felled away from stream. Streams are to be protected from mud and siltation by prohibiting or suspending yarding operations, as determined necessary, during periods of heavy rainfall. Logging debris that enters streams or accumulates along the stream banks is to be removed concurrently with logging operations to prevent stream blockage during periods of high water.

Other measures which will be used, as determined appropriate and necessary, to mitigate adverse impacts on aquatic wildlife include (1) stabilization following logging of disturbed areas, especially skid trails and spur roads, (2) removal of temporary drainage or crossing structures from streams, (3) use of sediment and debris traps, and (4) limiting the season and period of logging.

Transportation

Adverse impacts associated with road construction and maintenance are to be mitigated by observing the following guidelines.

- Locate roads away from the aquatic habitat; use suitable vegetative buffer strips between roads and streams.

- Locate and design roads to minimize sidecasting of soil, rocks and debris.

- Avoid obtaining road gravel from streams.

- Avoid making stream channel changes.

- Riprap unstable banks along streams.

- Stabilize road cuts and road fills with vegetation which exhibits superior soil-holding capacity.

- Design and install culverts and other drainage structures that permit easy fish passage. Detailed specifications for culvert installation which permit best fish passage are to be provided by the fisheries or wildlife biologist depending on the species of fish and the specific problem. Culverts, under most circumstances, should be place on a grade of not more than .005 percent; and culvert water velocity should not exceed 4 feet per second for salmonid fish. For some species, especially those in the Taiga, water velocity should not exceed 2 feet per second.

- Locate rock-crushing and washing sites away from streams.
- Use road-surfacing materials that resist erosion during wet weather.
- Divert or transport culvert water to stable slopes by using downspouts, aprons, or energy dissipators.
- Install culverts and bridges which will efficiently and effectively accommodate ditch and/or streamflow.
- Prohibit construction during periods of heavy rainfall, except in unusual situations.
- Dispose of soil and debris from landslides by endhauling to locations away from streams, lakes, or other water bodies.
- Leave vegetative buffer strips between roads and the aquatic habitat when applying chemicals for brush control.
- Minimize construction activities during critical need season, i.e., during spawning and migration periods.

3. Domestic Livestock

The adverse impacts of timber management practices (including cutting, logging and land treatment) are to be mitigated by coordinating, as appropriate, the grazing management program with the timber management activity, i.e., conducting timber management operations during periods when the area is not being grazed. In some cases, domestic livestock may be moved from an area to protect livestock from accidents and disturbance during timber harvest and removal operations.

Land removed from timber production and, consequently, grazing use by the construction of roads, trails and landings will be minimized. Roads, trails and landings will not be over built. Existing facilities will be used whenever possible.

Following construction activities or harvest operations, areas subject to accelerated erosion will be revegetated with suitable forage and browse species. Where applicable, roads and trails that are no longer essential to timber management activities will be put-to-bed.

The adverse effects of chemical weed control on domestic livestock will be mitigated by using chemicals that are selective, thus, causing little damage to the more palatable forage species. The impacts of chemicals on livestock, either through external exposure or by ingesting contaminated forage, will be avoided by removing livestock and/or deferring grazing on treated areas. Adverse effects of fencing and screening will be mitigated by locating fences and other livestock management facilities to provide a systematic and coordinated use of the forage resource.

H. Micro and Macroorganisms

1. Soil Organisms

Since soil and soil organisms are closely interrelated, the mitigative measures for minimizing or eliminating the adverse impacts of timber management practices on soil, as described in Chapter IV (C), are also applicable to soil organisms; therefore, they will not be repeated.

2. Aquatic Organisms

Forest Development

Vegetative buffer strips will be used to reduce adverse effects on aquatic life caused by scarification, mechanical brush cutting, area or spot burning, chemical weed control, fertilization, snag felling, and baiting. Soil erosion, following scarification and mechanical brush cutting, will be minimized by revegetating treated areas and by waterbarring, as necessary, roads and trails.

During aerial seeding or application of pesticides and fertilizers, helicopters will be given preference over use of fixed-wing aircraft. Caution will be exercised to prevent accidental fertilizer or chemical discharges into waterways. Herbicides will be used, where necessary, to control undesirable phytoplankton blooms caused by fertilization.

Protection

Insecticides least toxic to aquatic life will be used and at the recommended rates of application. Buffer strips adjacent to streams and lakes will minimize impacts on the aquatic habitat. Care will be exercised in applying fire retardants to avoid direct hits on streams or lakes.

Cutting Practices

The least amount of soil erosion results from the lightest cutting practices, i.e., in selection or shelterwood cuttings. However, adverse impacts of cutting practices in general will be mitigated by using buffer strips, as necessary, between the cutting areas and streams or lakes.

Logging Systems

Buffer strips will be used, where necessary, to protect the stream from felled trees, logs and debris created by falling and bucking activities. Any trees, logs, or debris that reach the stream are to be removed concurrently with the logging operations. Logging systems which cause the least soil disturbance on steep, fragile slopes will be used wherever practical to prevent sedimentation of streams. Aerial systems and buffer strips will be used where logs must be yarded across important streams or rivers.

Transportation

Measures which will mitigate impacts to aquatic organisms have been described in previous sections of this chapter; therefore, they will not be repeated.

I. Human Settlement and Land Use

The planning process described in Chapter I will be used to identify resource values and resolve conflicts. Conflicts which exist between two or more competing uses will be reconciled by adjustments in the timing or season of occurrence between conflicting uses, by adjustments in the relative intensity or level of use between uses, and by initiation of on-the-ground practices designed to minimize or avoid conflicts. If none of these measures is successful, then one or more conflicting uses must be eliminated for that planning area. The resolution of conflicts between land uses on the public lands and on adjacent non-federal lands can be accomplished through coordination with local governmental planning bodies. Where these bodies are absent or plans are inadequately enforced, conflicts may not be easily resolved.

In the following discussion on mitigation of impacts associated with timber management, reference will be made to land-use planning as a mitigative measure where appropriate.

1. Human Settlement

Health and Safety. Where human inhabitants live on or near lands where chemicals will be used to control or remove brush and weeds, the adverse impact on the health of these individuals is to be avoided by:

- Using only approved chemicals applied at the minimum rate necessary.

- Timely notification to local residents of the intent to conduct aerial spraying, including the date and time of the project operations.

- Using helicopters in lieu of fixed-wing aircraft to minimize drift and chance of off-target application.

- Applying chemicals when the wind is calm.

Chemicals will not be permitted to enter streams and open bodies of water. Ill effects caused by smoke created by slash burning will be mitigated by burning during periods when atmospheric conditions favor rapid rise and dispersal of smoke. All area and spot burning will be done in accordance with a smoke management plan. Where timber management is conducted on municipal watersheds, all activities shall be carried out in a manner that will not reduce the quality of water below the standards considered suitable for human consumption. Quarrying and rock-crushing activities will not be permitted where inhabitants will be subjected to excessive noise and dust. In these instances, alternate sources of quarry material and crushing sites located away from inhabitants are to be utilized. Design and development of the quarry will minimize the risk of injuries to workers and the public; and where necessary and practical, quarries shall be rehabilitated to conform as nearly as possible to the surrounding land. Safety hazards associated with log trucks and the motoring public will be minimized by proper road design. This will include avoiding curves, providing suitable passing areas (turnouts) and use of warning signs. Accidents and injuries to personnel engaged in timber management activities will be minimized by ensuring that employees are adequately trained for their work and are fully aware of proper woods safety including the wearing and maintenance of safety equipment.

Social. Property owners will receive compensation for lands acquired by easement or condemnation. Condemnation will not be invoked until all reasonable solutions, including alternate routes for access roads, have been explored.

2. Wilderness

Commercial forest lands unique in character, including existing roadless areas, will be identified in the Bureau planning process and evaluated for withdrawal as natural or primitive areas. Implementation of timber management activities in the de facto wilderness areas of interior Alaska are to be deferred pending completion of detailed and comprehensive land-use plans.

Impacts to wilderness areas, or areas under study for such designation, lying adjacent to Bureau lands are to be identified in the planning process. Land-use plans shall provide protective measures to reduce or eliminate the impacts of timber harvesting on these areas. Protective measures shall be coordinated and discussed with the responsible administering agency and with the public during the land-use planning process and again during preparation of site-specific environmental analysis. Protective measures may consist of buffer areas, seasonal logging or other suitable impact control measures.

3. Recreation

Developed recreation sites are to be excluded from commercial sales unless selective thinning is required to obtain the proper sunshade relationship to support the designed recreation carrying capacity.

Potential recreation areas will be managed to enhance the recreational opportunities of an area. This may include lowering the basal area to encourage crown development, development of selected old-growth specimens, encouragement of young and secondary growth to gain visually acceptable variety, and the maintenance of proper sunshade relationships. Removal of hazard trees from developed recreation areas will be accomplished, to the extent feasible, during the periods of least use. Potable water supplies for recreation sites will be protected from possible contamination caused by timber management practices, including the hand or aerial application of pesticides. Proper hazard warning and surveillance shall be utilized in protecting forest users from pesticide applications and to insure that recreation areas are suitable for use following such applications.

As more timber access roads are developed, a new land-use direction is created. With more roads open for recreational activities (i.e., picnicking, sightseeing, berry picking, off-road vehicle use, etc.), provisions must be made to control the secondary impacts associated with these activities. Roads providing access to recreation sites will be constructed to standards that permit both car and truck traffic to move safely. Sedimentation, scouring, and mass soil movement will be minimized by maintaining vegetative buffer strips along streams, rivers and lakes to protect waters utilized by fishermen, boaters, and swimmers.

Since wildlife contribute to the quality of forest recreation, wildlife habitat improvement will be considered in planning timber management activities. Adequate escape cover will be retained; and bedgrounds, calving and feeding areas will be reserved or protected from harvesting operations. Special cutting practices may be required in order to perpetuate resident species. To the extent feasible, den trees or nesting trees will be reserved and seasonal restrictions placed on logging operations to avoid harrassment of wildlife during critical times such as nesting and rearing periods.

Recreational values on adjacent lands including units of the National Park System, U.S. Forest Service, other federal agencies, state, local and county governments, and private organizations are to be protected through the use of cutting practices which detract least from the surrounding environs. Where appropriate, adequate buffer zones will be established to protect adjacent recreational lands from the impacts of timber harvesting. Additionally, all interested parties will be invited to participate in the preparation of land-use plans and will be afforded the opportunity to review and comment on environmental assessments and impact statements prepared for actions which could impact adjacent lands and land uses.

Recreation facilities damaged during timber management activities will be reconstructed or repaired. Discarding of debris (cans, cable, papers, etc.) will not be permitted under the terms and conditions of a contract. Where violations occur, the operator will be required to remove the debris to suitable disposal sites. Failure to do so may result in contract suspension or forfeiture of the performance bond.

4. Grazing

Timber management activities will be coordinated with grazing management activities on those areas available for both uses. When conditions warrant, gates or cattle guards will be installed across roads to prevent livestock from drifting into timber sale areas, reforestation sites, thinning areas, etc.

5. Agriculture

The drift of chemicals onto nearby cropland will be controlled by using helicopters, by buffer strips, and by spraying only on calm days. Impacts to irrigation reservoirs and attendant facilities from siltation will be mitigated by minimizing timber management practices that disturb fragile soils. Buffer vegetation will be retained along streams to stabilize banks and to reduce stream sedimentation.

6. Commercial, Residential and Industrial

Conflicts between timber management practices and adjacent residential and commercial land uses can best be mitigated by preventing them from occurring. Coordination of Bureau land-use plans with the state/local planning and zoning bodies will advise managers of the land uses likely to occur on adjacent, private lands which would conflict with timber management activities and, conversely, will advise local governments of the Bureau timber management program, thus, permitting more informed decisions in zoning and subsequent development of private lands.

7. Local Government and Public Services

Disruption of utility services caused by timber management activities will be avoided through proper planning. Land-use plans will be used to: (1) inform public service companies of areas that should be avoided in planning utility route locations, and (2) identify and designate corridors across the public lands where utility corridors can be constructed with minimal land-use conflicts. Impacts to local and state highways can be mitigated to some extent by coordinating transportation needs with county and state highway departments.

J. Aesthetics and Human Interest

1. Aesthetics

a. Visual Resource Impacts

Visual Resource Management procedures will be employed to minimize the adverse, visual impacts created by timber management activities. Where necessary, an interdisciplinary staff of specialists will be used including the design expertise of a landscape architect.

Basically, Visual Resource Management consists of three major components: (1) the Visual Resource Inventory and Evaluation component, (2) the Visual Resource Contrast Rating component, and (3) the Visual Resource Project Planning and Design component.

The *Inventory and Evaluation* component is an integral part of the Bureau Planning System which is described in Chapter I(C). This component which classifies the visual resource into five management categories (based on scenic quality rating, visual sensitivity level, and visual zones) forms the basic framework for subsequent applications of Visual Resource Management techniques.

The Visual Resource Management *Contrast Rating* component is the "design analysis process" or methodology used to determine the extent of visual impact of an existing or proposed activity on a particular landscape and its component elements of form, line, color and texture. Thus, the contrast rating procedure systematically identifies the potential or actual impacts and permits the design or formulation of appropriate methods, techniques and measures which can be employed to *reduce* the visual contrast created by a proposed activity on the landscape. This latter process is the Visual Resource *Project* *Planning and Design component*.

Visual Resource Management has various applications in timber management activities, e.g:

- The concept of continuous canopy management may be used to meet the criteria for VRM Class II and III lands. This concept employs a system of modified shelterwood cutting that defers final removal of the forest overstory until understory regeneration is large enough to present a forest-like appearance.[53] It will also involve the design of timber sales to complement the characteristic landscape. All phases of timber sale planning including landing locations, road locations, logging methods, silvicultural practices, reforestation methods, etc. will be considered in the design process.

- The concept that timber sales and their attendant activities will, to the extent practical, create additional variety (i.e. open spaces) within major transportation corridors. Vistas will be created. Visually acceptable variety will be stressed in roadside and scenic management. From the well-traveled transportation system, the visual zones (foreground, middleground and background) will be managed to meet the Visual Resource Management class objectives as described in the respective Bureau documents. Timber stand entries will also be planned and designed to meet Visual Resource Management class objectives.

- Atmospheric dust caused by road construction operations can be reduced by watering subgrades during blading and surfacing operations. Fugitive dust from log trucks will be abated by oiling roads or surfacing them with bituminous material or macadam where critical dust conditions exist. Periodic application of water or waste sulfite liquor to dirt or gravel surfaced roads will reduce the dust problem.

- Visual impacts to the atmosphere created by smoke from slash burning will be minimized through smoke management procedures. This involves the coordinated effort of meteorologists and public and private forestry agencies to integrate burning schedules with weather reports and forecasts to produce rapid fuel combustion and quick dispersal of smoke into the atmosphere.[54] Alternative slash disposal measures which do not create smoke may also be employed where conditions permit. These alternate systems may include chipping or burying of slash or use of equipment utilizing an air curtain combustion system.

- The principle that timber sale planning and execution on lands classified as Visual Resource Management Class II, III or IV will be planned and designed to meet the specified Visual Contrast Rating.

Timber sale design will involve evaluation of the proposed action on such variables as the distance zone (foreground, middleground, background or seldom seen), the angle of the critical observation, scale, light, season of year and time. The variables shall be analyzed against viable timber management techniques and, concurrently, will be evaluated as to their combined visual impact on the particular landscape. As a result, the proposed timber sale including all of its discrete activities will be designed, implemented, and administered to meet the Visual Resource Management Objectives. Figures IV-1, IV-2 and IV-3 provide graphic examples of various landscapes where Visual Resource Management techniques are used to eliminate or reduce the visual impact.

b. Sound, Odor, and Mood

Little can be done about odors emanating from internal combustion engines. The smell of smoke from burning slash and of dust from various operations can be mitigated to some extent by measures described previously under Visual Impacts. The high noise levels produced by logging and construction equipment could probably be reduced by improved muffler systems; but so far as is known, there has been no effort in this direction.

2. Geologic Human Interest Values

Identification and designation of unique geological formations through land-use planning procedures are the principle means of mitigating impacts to these resources. Timber management activities will be planned and executed to prevent damage to such formations. Where geologic values will be jeopardized by timber management activities, the area is to be excluded from timber production.

3. Archeological Human Interest Values

Areas subject to timber management activities will be inventoried, and all cultural resources identified will be evaluated. This process will include the following steps:

- The National Register of Historic Places will be consulted to determine if any properties on the Register are located in the project area.

- The State Historic Preservation Officer will be consulted to identity and evaluate properties in the project area that are not listed in the National Register but which may be eligible for nomination.

- Site inventories at museums, universities, historical societies, and other federal and state agencies will be consulted to determine if other cultural resources are present in the project areas.

- Other professionals and laymen, who are knowledgeable of cultural resources in the project areas, will be consulted.

VIEWING CONDITIONS:
Harvest areas are seen from the observer normal postition; harvest areas are located in the middle ground visual zone; the position of the viewer is fixed relative to the presented landscape

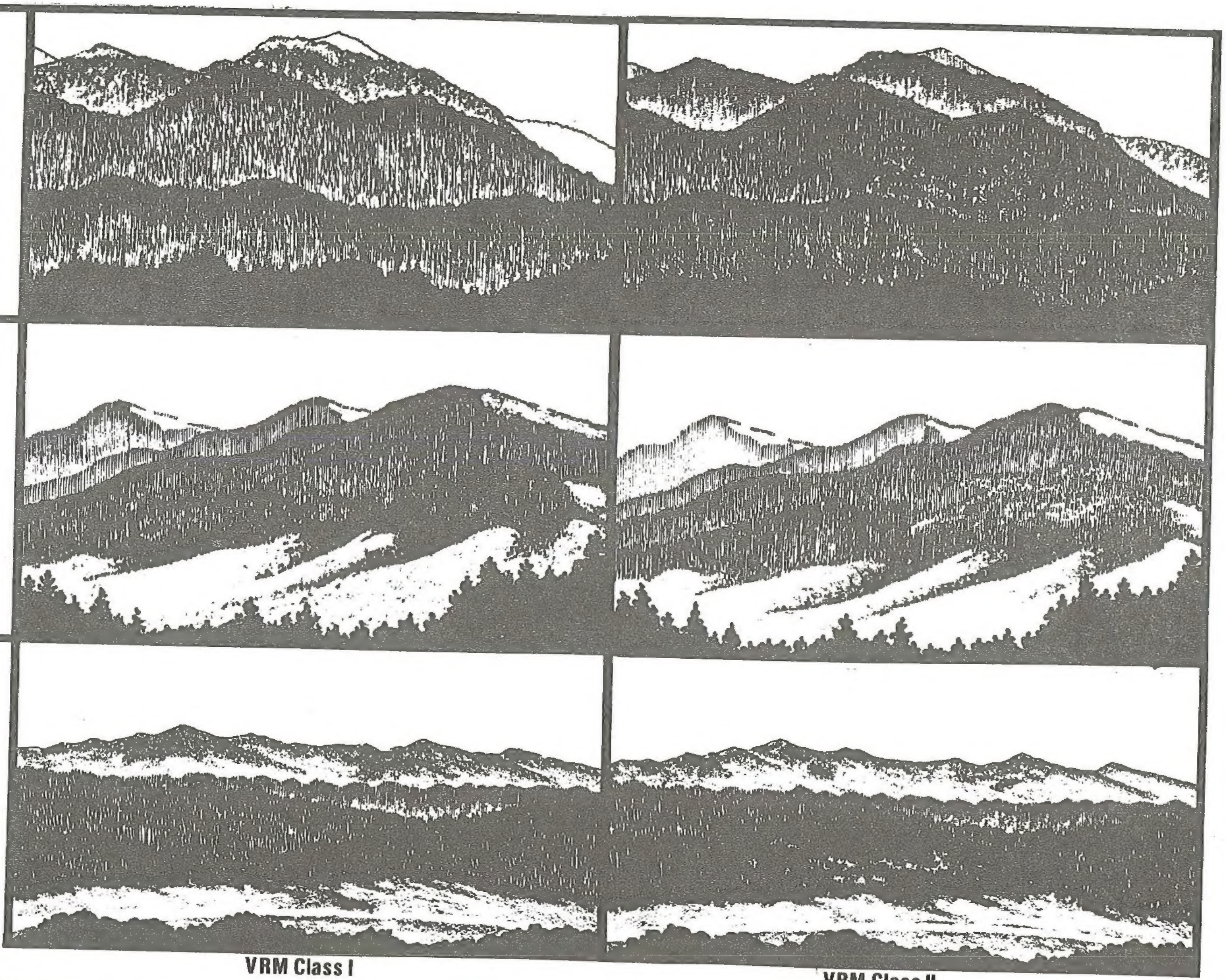
VISUAL RESOURCE MANAGEMENT CLASS I — Provides for natural ecological changes only. (no cut)

VISUAL RESOURCE MANAGEMENT CLASS II (VRM) CONTRAST RATING 10. Changes in any of the basis elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.

Type I — Landscape Characteristics:
Steep, rugged topography; dense, mixed timber stands with few natural openings.

Type II — Landscape Characteristics:
Fairly steep, rolling topography; mixed timber stands at higher elevations, marked differences in vegetative habitat types from NE exposures to SW exposures; many natural forest openings.

Type III — Landscape Characteristics:
Flat to gently rolling topography; timber stand mixture tends to be dominated by single species; natural forest openings common.



VRM Class I **VRM Class II**

Sketches from: Forest Landscape Management, USDA, Forest Service, Northern Region, 1972

FIGURE IV-1

VIEWING CONDITIONS:
Harvest areas are seen from the observer normal postition; harvest areas are located in the middle ground visual zone; the position of the viewer is fixed relative to the presented landscapes.

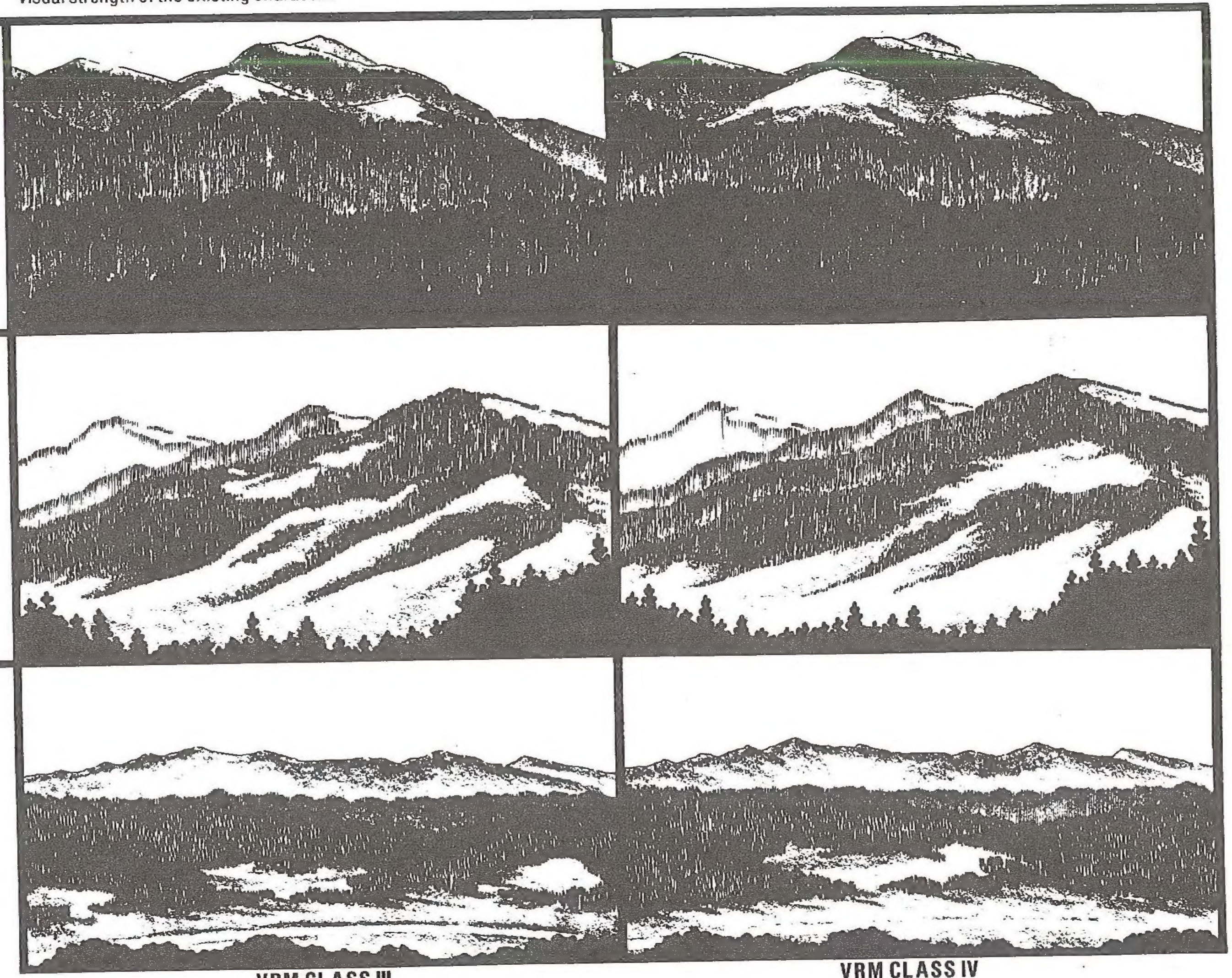
VISUAL RESOURCE MANAGEMENT CLASS III. (VRM)CONTRAST RATING 16. Changes in the basic elements(form, line, color and texture) caused by a management activity may be evident in the charactecristic landscape, however, the changes should remain subordinate to the visual strength of the existing character.

VISUAL RESOURCE MANAGEMENT CLASS IV. (VRM) CONTRAST RATING 20. Changes may subordinate the original composition and character, but must reflect what could be a natural occurrence within the characteristic landscape.

Type I — Landscape Characteristics: Steep, rugged topography; dense, mixed timber stands with few natural openings.

Type II — Landscape Characteristics: Fairly steep, rolling topography; mixed timber stands at higher elevations, marked differences in vegetative habitat types from NE exposures to SW exposures; many natural forest openings.

Type III — Landscape Characteristics: Flat to gently rolling topography; timber stand mixture tends to be dominated by single species; natural forest openings common.



VRM CLASS III **VRM CLASS IV**

Sketches from: Forest Landscape Management, US.DA, Forest Service, Northern Region, 1972

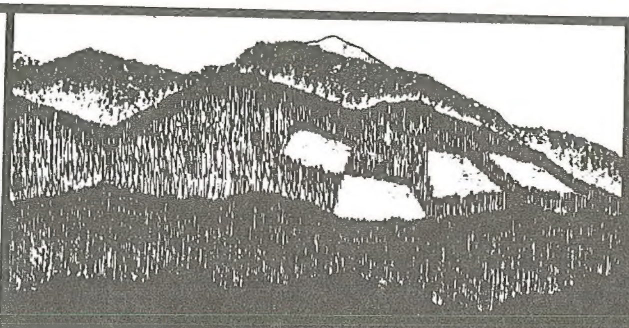
FIGURE 2

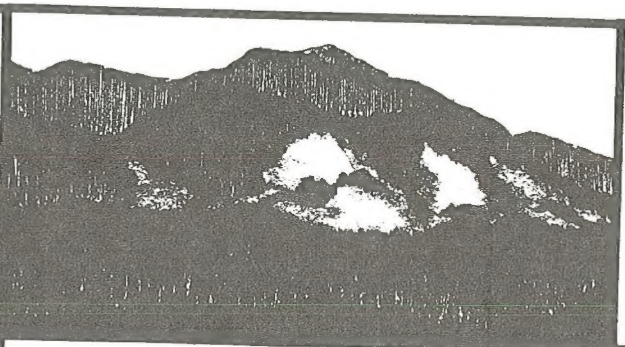
VIEWING CONDITIONS:
Harvest areas are seen from the observer normal postition; harvest areas are located in the middle ground visual zone; the position of the viewer is fixed relative to the presented landscapes.

VISUAL RESOURCE MANAGEMENT CLASS V—Change is needed. Considered an interim short-term classification until one of the other class (II-IV) can be reached through rehabilitation or enhancement.

DISCORDANT QUALITIES: Cutting pattern shapes, sharp edge contrasts, lack of visual linkage among cutting patterns or with landscape characteristics.

Type I — Landscape Characteristics:
Steep, rugged topography; dense, mixed timber stands with few natural openings.

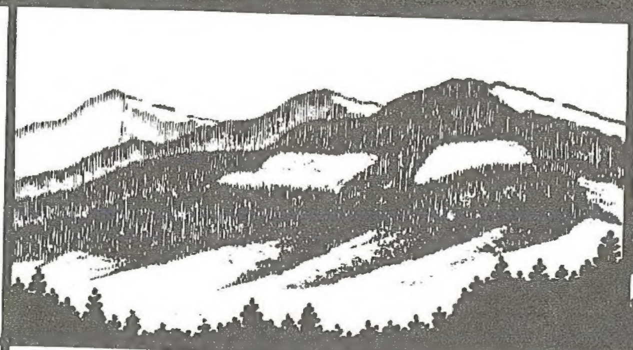


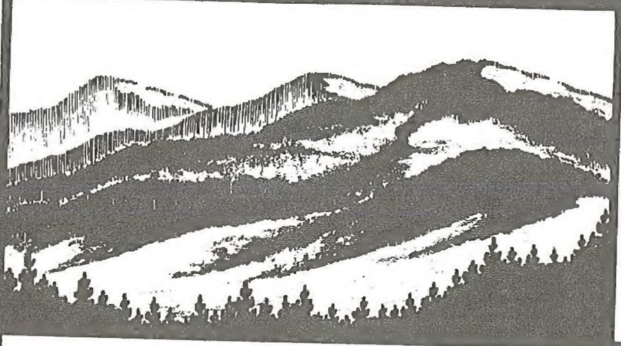


Rehabilitative Measures:

- Shape variation (by additional small sales)
- Edge modification (thinning cuts) to reduce sharp contrast
- Creation of visual linkage among cutting patterns and with landscape characteristics.

Type II — Landscape Characteristics:
Fairly steep, rolling topography; mixed timber stands at higher elevations, marked differences in vegetative habitat types from NE exposures to SW exposures; many natural forest openings.

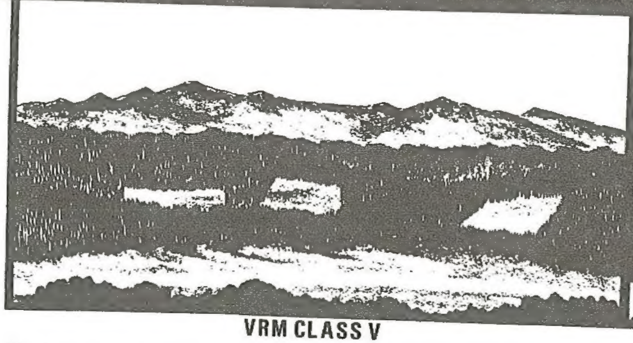


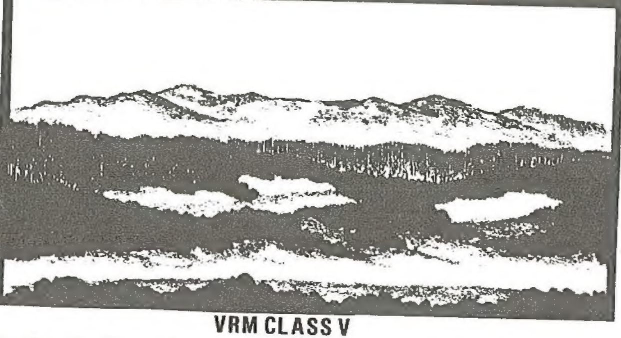


Rehabilitative Measures:

- Shape variation (by additional small sales)
- Edge modification (thinning cuts) to reduce sharp contrasts.
- Creation of visual linkages among cutting patterns and with landscape characteristics.

Type III — Landscape Characteristics:
Flat to gently rolling topography; timber stand mixture tends to be dominated by single species; natural forest openings common.





Rehabilitative Measures:

- Shape variation (by additional small sales)
- Edge modification (thinning cuts) to reduce sharp contrasts
- Creation of visual linkages among cutting patterns and with landscape characteristics.

VRM CLASS V **VRM CLASS V**

Sketches from: Forest Landscape Management, USDA, Forest Service, Northern Region

FIGURE IV-3

- If the above data reviews indicate the project areas have not been adequately surveyed, a *Class II inventory (reconnaissance field inventory) will be completed. These inventories will be made by a qualified cultural resource specialist or by other individuals trained for such inventories and who are under the guidance of a qualified cultural resource specialist. All cultural resources identified will be evaluated for nomination to the National Register a professional cultural resource specialist.

Cultural resources not eligible for nomination to the National Register will be protected from impact. In those cases where protection is judged not to be feasible or appropriate, the necessary steps to minimize the impact will be accomplished. Mitigation will include, as determined necessary, documentation, surface collection, excavation, and/or relocation. Such mitigation will be determined/prescribed or approved by a qualified cultural resource specialist.

Cultural resources that are on, or eligible for nomination to, the National Register shall not be subjected to any timber management activity which may have an effect upon the site without first providing the Advisory Council on Historic Preservation a reasonable opportunity for comment.

All contracts will include stipulations designed to prevent the inadvertent destruction or alteration of cultural resources. If a cultural resource is discovered during project operation, activities will be stopped until a professional evaluation of the resource can be made and adequate mitigative measures completed.

4. Historical Human Interest Values

Mitigation is the same as for archeological values.

5. Ethnic and Religious

Mitigation of impacts on ethnic and religious groups is best accomplished through understanding of and adherence to civil rights laws and regulations pertaining to employees of the federal govenment or it contractors. Ethnic and religious groups are to be encouraged to participate in the development of land-use plans. Areas of particular significance, such as sacred Indian burial grounds, are not to be subjected to timber management practices when these practices conflict with cultural, ethnic or religious values.

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* Class II Inventory is a cultural resource inventory based upon the identification and evaluation of all cultural resources in a portion of an area which will permit an estimate of the nature and distribution of cultural resources of the entire area.

K. Wildfire

The Protection phase of the timber management program employs most of the mitigative measures available to minimize the risk of fire occurrence and impacts of fire control activities. Consequently, the mitigative measures to be employed in fire control and suppression activities are described in the previous parts of this chapter and will not be repeated here.

Administrative-type mitigative measures that relate to the prevention and/or early control of accidental fires are to be employed. These include preattack or prefire planning systems, suspending forest operations during period of low humidity, providing fire-fighting equipment on the operations site, clearing around warming fires, proper equipment maintenance, smoking restrictions and others. These types of measures are designed to minimize the risk of fire or insure immediate suppression of a fire and have no impact on the environment.

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V. ADVERSE IMPACTS THAT CANNOT BE AVOIDED

This section discusses the adverse impacts which can be expected to remain after the applicable mitigative measures described in the preceding chapter have been applied. It comprises a compilation of unavoidable impacts not subject to mitigation and the cumulative residual adverse effects likely to remain despite mitigative efforts. These unavoidable impacts do not include those impacts occurring when potential land use or resource programs conflict and are unreconcilable, resulting in a management decision to classify a particular area for a single use or selected uses. Depending upon the nature of the classification or action, the unavoidable impacts of timber management practices set forth in this chapter may be either diminished or increased.

An overall characteristic of the current and projected program is to increase the occurrence of the environmental impacts of timber management practices at any given point in time. This occurs in part because the use of artifical reforestation practices, along with other practices, reduces the number of years needed to produce crop trees which, in turn, increases the number of acres cut and logged each year. In addition to the impacts stemming directly from intensive management practices, the acreage of mature timber harvested each year is increased during the transition from a predominately overmature forest to a young-growth forest because of future expectations of increased wood yields.

A second overall characteristic of the program is to increase the frequency of environmental impacts on any given area over time. For example, over time a typical silvivultural regime in western Oregon could eventually include planting, precommercial thinning, fertilizing, commercial thinning and final harvesting a given stand. Under an average rotation of 85 years, the treatments would be carried out as follows: (1) stand establishment in year zero, (2) precommercial thinning in year 20, (3) commercial thinning combined with fertilization in years 30, 40, 50, 60, and 70, and (4) final harvest in year 85. Consequently, the site or stand would be subjected to a series of 13 treatments in the course of 8 stand entries over an 85-year period. There are many different silvicultural regimes resulting in fewer or more treatments; however, the foregoing illustration is fairly representative of the sequential disturbances to which an area available for intensive management will be exposed. As the present overmature stands are replaced with young-growth stands over time, the area impacted by the foregoing developmental and interim harvest practices will progressively increase.

Because of these program characteristics, most of the environmental impacts discussed in this Chapter may be viewed as occurring both throughout the forest and on a continual basis.

A judgement factor was imposed to estimate the effectiveness of mitigative measures assuming thoroughness in their execution and probability of favorable technical results. It has been assumed that prescribed mitigative procedures will be used and enforced, adequate money and manpower will be available, and the contractor or private operator will be cooperative.

In some of the sections that follow, the development, protection, cutting practices, logging methods and transportation phases are considered collectively since their continued separation in this and subsequent chapters is not as meaningful or as helpful to the reader as in previous chapters.

A. Ecological Interrelationships

Timber management will result in the formulation of man-caused seral stages, formation of new disclimaxes, changes in the cyclic aspects of existing seral stages and the reduction of various species in biological communities. Over time, the present character of the forest will be significantly changed by the replacement of old-growth stands (200 years in age and older) with young-growth stands. The transition period will be approximately 20 years for western Oregon forests, 40 years for the remaining forests, and an undeterminable number of years for interior Alaska as based on the current and projected low rate of timber harvest.

Consequently, there will be a gradual reduction in the extensiveness of the old-growth ecosystem along with its attendant biotic community. While some members of the community may be capable of relocation to old-growth stands not subject to cutting or may be adaptable to young-growth forests, others will be reduced in umber or almost totally eliminated. Although replacement of old-growth stands with young-growth stands also occurs in the natural environment, timber harvesting will dramatize and accelerate the process. The time-frame of 20 to 40 years to harvest old-growth will be a rapid destruction of the environment as measured against a natural system.

Most practices will alter the seral stage or development of a given biologic community. The extent will be relative to the geography and acreage involved. Species composition and population dynamics along with factors that affect life cycles, i.e., reproduction, survival, food chains, etc. will be altered.

During the decade, an average of 19,000 acres or about 1.0 percent of the forests in western Oregon will be directly subjected to the unavoidable impacts associated with clearcutting and logging (the percentage of affected forest area will be considerably lower in the remaining forests as only 800 acreas are clearcut annually). Concurrently, the construction of approximately 500 miles of road annually will directly impact 0.1 percent to 0.2 percent of the land until the road system is completed. These practices and others will adversely impact ecological interrelationships as a result of soil disturbance and vegetal destruction on individual areas throughout the forest. The basic processes relating to nutrients, water and energy will recover within one to five years on most areas due to natural, renewing means; and in the total forest community, a man-nature induced equilibrium will be established and maintained if proper forest management methods are prescribed and enforced. However, due to human errors and natural phenomena, there will be continuing instances where the ecosystems of small localized areas will be so severely impacted that recovery will not take place within decades from the time the impact occurred.

It can be reasonably assumed that, as the degree of program intensity increases, the risk of environmental degradation will also increase; however, improving technology will, to some degree, minimize these risks. Unfortunately, little is known of the combined impacts over time of the many practices on forest ecosystems in the United States or even of the impact of individual practices on a particular forest ecosystem, such as those in interior Alaska. Limited knowledge may, therefore, be the primary reason for the apparent general absence of extensive or significant damage to the ecosystem.

B. Physiography, Geology and Minerals

An indeterminable amount of mass wasting will occur on localized areas, the magnitude being contingent upon the rock type, rock structure, weather, hydrology and soil type. Those development practices that leave a higher percentage of the surface exposed on steep slopes, underlain by unconsolidated rock, will constitute the major part of this condition. Cutting practices and logging systems carried out on moist, steep slopes which involve removing a high percentage of the trees and the construction of tractor skid trails can be expected to result in, at least, some mass movement of soil and geologic material. Road construction will result in some indeterminable amount of mass wasting. There are no unavoidable, adverse impacts of significance on the mineral resources.

C. Soils

Over the current 10-year timber management program period, timber management activities will unavoidably disturb the soil on approximately 900,000 acres. Of this total 198,000 acres will be disturbed as a result of clearcutting. Clearcuts will generally not exceed 40 acres in size, and 190,000 acres of a total 198,000 acres to be clearcut in the program period will occur in western Oregon. The remaining 8,000 acres of clearcut area will occur in the remaining forests.

Sediment yield from these timber management activities will vary considerably depending upon a variety of variables such as slope, soil type and depth, yarding system and harvest method. One study in western Oregon indicates that erosion and sedimentation following road construction and timber harvesting increased from 3 to 90 times over that of the control area.[1] The following table summarizes the results of this study. The dramatic increase in sediment yield is primarily attributable to road construction.

SEDIMENT LOSSES RESULTING FROM SILVICULTURAL AND LOG TRANSPORT SYSTEMS [a/]

Silvicultural Harvesting System	Logging Transport System	Logging Roads Km (Miles)	Logging Roads % of Area Harvested	Sediment Lost in 9 Yr Metric Ton/Sq Km/Yr (Tons/Sq Mi/Yr)
Control (no harvest)	0	0 (0)	0	32.5 (93)
Clearcutting	Skyline	0 (0)	100	107 (307)
Clearcutting in patches	High Lead	2.65 (1.65)	25	2,794 (7,982)

Although these data re for specific logging methods and operations on a specific set of environmental conditions, similar trends in sediment loss will occur on other logged areas despite mitigation efforts.

The duration of the impact on the soil resource will likely be continuous since exposed areas on road cuts and fills will be constant sources of sediment. Generally, however, the majority of erosion will occur during the first 2-years following road construction and logging. Megahan and Kidd[2] for example found that about 84 percent to 93 percent of the total surface erosion from roads occurred in the first two years following construction. The sediment production rate then decreased progressively toward zero.

For the 700,000 acres (300,000 acres in western Oregon and 400,000 acres in the remaining forests) cut by shelterwood, seed tree, and selection methods, the impact on soils in a watershed will be considerably lower than for clearcutting since the impacts will be distributed over a much wider area. The remaining vegetation will also provide efficient buffers against erosion. Road construction, however, will continue to be the major source of sediment production from these areas.

During the program period approximately 5,000 miles of forest access roads will be constructed on Bureau-administered lands (500 miles per year). This construction will initially expose from

[a/] Fredriksen, R. L., "Erosion and Sedimentation Following Road Construction and Timber Harvest on Unstable Soils and Three Small Western Oregon Watersheds," USDA Forest Service Research Paper PNW-104, 15 pages (1970).

30,000 to 40,000 surface acres to surface erosion and, as previously indicated, will be the major source of sediment. Despite mitigating measures, road construction will also result in an undeterminable amount of mass wasting caused by road and slope failure. The residual affects of road construction and other logging activities are summarized in Table V-1.

D. Water

Heavy rains immediately following a prescribed burn, and before any or all rehabilitation measures can be accomplished or take effect, will cause suspended sediment to be carried into streams even through a wide vegetative filter strip. Heavy rains may also cause an increase in slope instability with a large debris avalanche or soil slump resulting. In such events, vegetative filter strips and buffer strips of timber and shrubs will sometimes be ineffective in preventing masses of debris and soil from reaching and damaging a stream. Unforeseen shifts in wind during chemical weed and brush control can cause drift of chemical pesticides into streams and other bodies of water.

Unavoidable impacts of applying insecticides, retardants, fertilizers, other chemicals/compounds and backfiring are the same as chemical weed and brush control and burning respectively, as described in the previous paragraph. The construction of a fire line on an active fire requiring immediate control will often not allow time for thorough planning and best location of fire lines. The same urgency will dictate that fire trails be built by heavy equipment with resulting degradation of water quality. During severe fire weather, several fires burning concurrently or within short-time intervals may preclude the use of limited manpower in applying erosion control measures promptly to fire lines.

The removal of vegetation by clearcutting in much of western Oregon will cause changes in the seasonal distribution of runoff and in the magnitude of some late fall, peak flows. Streamflow will be increased during the heavy rainfall periods, November through April. On sites with unstable soils, this increased streamflow or occasional higher peakflow could conceivably initiate a cycle of stream erosion and slope failures with a significant decrease in water quality.

The timber management practice of controlling hardwood regrowth by removal and replacement with conifers generally results in decreased streamflow. This decrease occurs primarily during heavy, mid-winter precipitation periods when hardwoods are dormant. Less effect on decreasing stramflow occurs during summer low-flow periods when both hardwoods and conifers are at the peak of their transpiration cycle.

An increase in peak flows and water yield may change the equilibrium between surface water discharge and the stream channel geometry. While reaching a new equilibrium, severe scouring and erosion can occur in the stream channel.

Surface runoff on disturbed areas, principally on those involving road construction activities, will accelerate to a minor degree the natural rate of enrichment of water bodies. Occassional mass soil movements will result in above normal sedimentation thereby degrading water quality.

There will be instances where clearcutting in northwestern Oregon will temporarily raise water temperatures due to increased exposure of small tributary waters to solar radiation. Also, logging debris will temporarily reduce the dissolved oxygen content of streams. Nonetheless, with few exceptions, water quality in terms of temperature and oxygen content will remain at non-lethal levels.

Felled trees may unavoidably slide down steep slopes and into or through streamside buffer strips, causing localized soil erosion or disturbance of the vegetation along the streambank. Some soil compaction is inevitable on any area that is tractor logged. Temporary, localized soil disturbance and erosion can be expected in most logged areas regardless of the logging system employed.

Streams near or adjacent to road construction projects will likely carry additional suspended sediment during the life of the road. Some of this sediment will be derived from excavation, embankment and bridge construction, culvert installation, and surface runoff from culverts and road and fill surfaces. Subsequently, culverts, slopes and surfaces may fail from water saturation, heavy loading or from blockage by debris following heavy rains or snowmelt, causing erosion or drainage to bypass regular channels and carry sediment in surface runoff to nearby streams.

E. Air and Microclimate

The burning of 9,000 acres of logging debris each year, principally in northwestern Oregon, will release particulates into the air; however, state air quality standards will be met. The smoke resulting from burning debris will sometimes constitute a minor nuisance to local inhabitants during the fall months. With improved utilization technology, it can be reasonably expected that the acreage subjected to prscribed burning will continue on a downward trend during the forthcoming decade. Extensive smoke from any wildfires caused by timber management practices could conceivably result in an undetermined number of accidents and deaths.

Inadequate research makes it impossible to predict what unavoidable, adverse impacts prescribed burning and brush removal may have on the microclimates of the Taiga Sub-biome. However, this ecosystem is generally considered a fragile one. Burning practices and brush removal may cause significant changes in local climates, particularly in permafrost areas. The discussion of prescribed burning also applies to the unavoidable impacts of backfiring on local climates.

When it is necessary to clearcut insect-infested timber on a severe site and to burn the slash to forestall an epidemic, the resulting exposure may create microclimate conditions which make regeneration of the site difficult. In addition, deviation of the general climate from its normal pattern for a year or two following normal cutting practices may cause microclimatic changes which inhibit regeneration and favor the invasion of the site by brush. Cutting practices could have significant, unavoidable impacts on the microclimates of the Taiga Sub-biome, but lack of research makes these impossible to identify.

The unavoidable, adverse impacts of road construction and log hauling on local climate are relatively minor. Air quality will be temporarily degraded by engine emissions, and fugitive dust will sometimes be a nuisance in the vicinity of road construction operations and along logging roads. Microclimates will be permanently modified in limited areas on road rights-of-way.

F. Vegetation

1. Terrestrial Vegetation

Significant, short-term adverse impacts (e.g., immediate and extensive destruction of existing vegetation) will frequently be accepted as a cost of avoiding adverse, long-term impacts (e.g., excessive delay (over 5-years) in regenerating and developing a new forest similar to the one removed). The classic example will occur most frequently in the North-west Coastal Sub-biome where clearcutting, scarification, aerial spraying of herbicides and area burning will, as appropriate, be used to insure timely replacement of a well-stocked, Douglas-fir forest in preference to vegetative cover of shrubs, hardwood trees and scattered hemlock or Sitka spruce. Recommended mitigating measures, therefore, are often in conflict between long-term and short-term impacts; when this occurs, attention is usually given to mitigating long-term impacts.

Adverse impacts will likely occur due to accidental or inadvertent misapplication of certain practices in the presence of unrecognized environmental conditions. An example is the failure of tree regeneration caused by unforeseen rapid growth of herbaceous or non-coniferous, woody vegetation following application of normally "safe" actions such as (1) shelterwood cutting in the Montane and Taiga Sub-biomes, and (2) clearcutting on relatively cool-moist sites in the Northwest Coastal Sub-biome and certain vegetative zones of the Montane Sub-biome.

2. Aquatic Vegetation

The natural rate of sedimentation of aquatic ecosystems will be increased slightly by many timber management practices. Streams, rivers, lakes and water bodies so impacted will have decreased vegetative productivity thus impacting other aquatic biota. Increased sedimentation shortens the natural life of lakes, ponds, marshes and estuaries by filling their basins, thereby, accelerating plant succession and eventual conversion to land masses. Aquatic plants are ultimately replaced by terrestrial vegetation in the process which usually requires centuries under normal conditions.

G. Animals

1. Terrestrial Wildlife

The implementation of many mitigative measures will serve only to reduce, and cannot avoid, short-term, adverse impacts on terrestrial wildlife. Individual, small animals, for example, will be killed or displaced by timber management activities such as scarification, mechanical brush cutting, area burning, falling and bucking, yarding and road construction. Deer, elk, rabbits, grouse and other wildlife species will be deprived of a portion or all of their habitat, food source or cover on those areas subjected to mechanical or chemical brush and weed control. These effects, however,will be temporary since the site is rarely denuded of all competing vegetation and regrowth or invasion of the site usually occurs quickly (first growing season) following the intensive management activity. The population of species that are associated with old-growth forests such as the northern spotted owl, pine marten, pileated woodpecker, goshawk, northern flying squirrel, and bushy-tailed woodrat will be reduced as the extent of their habitat is diminished. Some species dependent upon old-growth forest could become threatened or endangered. Small rodents will be vulnerable to poisoned baits despite most mitigating measures.

Roads will permanently remove 30,000 to 40,000 acres of wildlife habitat, encourage harrassment of wildlife through ease of vehicular access (including off-road vehicles), and reduce the area available to wilderness-inhabitating species.

2. Aquatic Wildlife

Riparian habitat, the aquatic environment and associated wildlife will be adversely impacted due to sedimentation, landslides and some habitat modification emanating principally from road construction activities. Logging debris will occasionally block streams, cover spawning areas and, dependent upon the time of year, may temporarily hamper the migration of anadromous fish such as steelhead and salmon. Where sedimentation of streams occurs, gravel-spawning fish such as salmon and trout will have reduced egg survival. Any accidential spills or drifting of chemical toxicants into waterways can have a severe impact on aquatic life. In general, the impacts associated with road construction and the accessibility provided by roads to fishermen represent the most significant impact on the riparian vegetation, aquatic habitat and aquatic wildlife populations.

3. Domestic Livestock

Impacts of timber-management actions on sheep, cattle and horses are relatively short term and minor.

H. Micro and Macro-Organisms

1. Soil Organisms

Some short-term, adverse impacts will occur in the form of reductions and imbalances of organism populations. This will result from those practices which compact the soil, reduce soil moisture, raise soil temperatures or decrease carbon supplies. Usually, the impact will be short-lived because of the dynamic, reproductive characteristics of these organisms. In the case of continuing erosion and permanent roads, the adverse effects will continue until the sites are stabilized or the roads reclaimed. The impact of localized mass soil movements that result in the exposure of bare rock or parent material will be long term.

2. Aquatic Organisms

The cumulative effect of all forest management activities will be to increase the rate of sedimentation in aquatic ecosystems. Unpredictable, mass soil movements which occur along roads and in logged areas will further add to natural stream sedimentation. The effects of excessive sedimentation on all organisms is unknown, but many populations are adversely affected. The magnitude of such effects can only be determined by careful on-site examination.

I. Human Settlement and Land Use

1. Human Settlement

Health and Safety. The primary, unavoidable impact will involve workers in timber-related jobs; accidents that cause injury and occasionally deaths will occur. Accidents involving the motoring public and log trucks and other logging equipment will occur as long as commercial and non-commercial use of roads is simultaneous.

There will be occasions when smoke from slash fires will drift over inhabited areas despite mitigative measures; however, no significant impacts are expected. Unavoidable impacts to health and safety, resulting from fugitive dust emissions, will not be significant.

Social. Unavailable adverse impacts will remain as a result of road right-of-way acquisition. Private lands will be subjected to outside influences, including the possibility of increased vandalism.

2. Mineral Development

There should be no unavoidable, adverse impacts of significance on mineral development. There may be, however, instances where removal of timber could destroy location monuments on existing mining claims or hamper mining operations for a period of time because of conflicting operations.

3. Wilderness

The construction of roads along with most other timber management activities will result in the alteration of natural undeveloped forests. This, in turn, will destroy any wilderness-type values that are often associated with "virgin" old-growth forests. Although there will be old-growth forests not available for timber production, their extensiveness will be significantly diminished, thereby, adversely affecting some segments of the public. The major undeveloped forests which meet formal wilderness area criteria are located in interior Alaska, 99 percent of which will not be subjected to timber management practices based on the projected program for the next decade.

Timber management activities on Bureau-administered lands do not pose a significant threat to wilderness values on other agency administered lands.

4. Recreation

The irregular reduction in the water quality of streams and lakes, primarily in the form of sedimentation, will serve as a detriment primarily to fishermen and secondarily to swimmers and boaters. The occasional invasion of waterways by logging debris will heighten this impact. The risk of toxicants being introduced into waterways as a result of practices employing chemicals will exist and, if accidental spillage or drifting does occur, fish populations and, in turn, fishermen will be adversely affected. Any general recreation use of specific areas will be temporarily disrupted during the period that timber management practices are carried out on the area. The loss of old-growth timber will result in the reduction or possible elimination of some fauna or flora adapted to this environment. Consequently, recreationists interested in this type of habitat will be adversely impacted by the proposed management program.

Studies have shown that road construction associated with logging is a major factor in causing surface erosion and mass soil movement further resulting in degradation of water quality.

Log truck and additional recreation-use traffic will increase hazards to public safety. The accompanying dust will be a nuisance to people on or alongside routes of travel.

Recreational fishing is heavily impacted when turbid water results from logging or road building activities. Stoppage of sport fishing has occurred because angler success is generally low in muddy water. Any loss of fish populations is also a direct impact to the sport fishery by causing reduced success. In the case of anadromous fish, important state, multi-state and international fisheries could be impacted.

Significant residual impacts to adjacent recreation lands, such as state parks or units of the National Park System, are not anticipated.

5. Grazing

No adverse impacts will occur except in those instances where grazing is subordinated to timber-management goals. Even with possible grazing reductions, the impacts on a national basis would be insignificant; however, on a local basis, some livestock operators could be adversely affected.

Timber management activities will not have a significant impact on wild horses and burros.

6. Agriculture

Barring unavoidable accidents and natural phenomena, there should be no unavoidable impacts to agriculture.

7. Commercial, Residental and Industrial

There should be no unavoidable impacts on residential, industrial, or commercial enterprises.

8. Local Government and Public Service

There will be no unavoidable impacts on public services, with the exception of possible, accidental interruptions of utilities located in timber management areas.

There will be unavoidable impacts on some local and state functions, such as increased highway maintenance, due to the traffic and activities associated with timber management.

J. Aesthetics and Human Interest

1. Aesthetics

Timber management will continue to cause impairment of aesthetic values. Degree of impact will depend upon the timber-management practices to be employed and the visual priority of the area which will be impacted. Clearcuttings and heavy partial cuttings will detract from the natural appearance of the forest. The impact of clearcutting will be greatest in northwestern Oregon with the clearcutting of approximately 17,500 acres annually. An additional 1,500 acres will be clearcut annually in southwestern Oregon and approximately 800 acres annually in the remaining forests. The unsightly characteristics associated with this practice, as preceived by some segments of the public, will adversely impact the environment and will be visible for a period of 10 to 15 years following cutting. The noise and dust caused by cutting, logging and transportation practices will interrupt the serenity that is often sought in the forest. While infrequent, wildfires caused by timber management activities will occur and significantly impact aesthetic as well as other values. The replacement of old-growth stands with young-growth stands on lands available for timber production will adversely impact those people who enjoy viewing large and aged trees. The appearance of the forest will be further affected by the systematic patterns created by some artificial regeneration. Other adverse visual evidence may occur from such practices as precommercial and commercial thinning.

Road cuts and fills and the occasional mass soil movements which will occur as a result of accidental or ill-advised construction and logging operations will also be unsightly. The smells and sounds of timber-management operations will continue to adversely affect the moods of forest visitors.

2. Geologic Human Interest Values

There will be no unavoidable, adverse impacts on identified geologic features of human interest.

3. Archeological Human Interest Values

Due to the nature of archeological sites (difficult to locate), there may be an occasional site inadvertently destroyed during timber-management activities.

4. Historical Human Interest Values

There will be no unavoidable impact on historical values.

5. Ethnic and Religious Values

There will be unavoidable impacts on ethnic and religious values. When different cultural styles meet for any length of time, there is inevitably a merging of the different styles and values. When two cultures are strongly opposed as between recent counter-cultures and older established cultures, attempts to completely mitigate the adverse effects are seldom successful.

K. Wildfire

It is impossible to eliminate all wildfires in the course of carrying out the timber-management program due to accidents, natural causes, and the carelessness of man. As a result, all the unmitigated impacts on the environment associated with wildfires, as described in Chapter III, will continue to occur on the affected areas along with the unavoidable impacts of the protection measures taken to control them.

L. Summary

Table V-1 summarizes the residual impacts (mitigated impacts) of timber management activities on selected environmental components. This table may be compared with Table III-2 (Chapter III, L) which similarly summarizes the unmitigated impacts. In reviewing these tables, the reader should keep in mind that the type and magnitude of impacts on specific elements of the environment may vary considerably from those identified. Effects on soils, for example, may be adverse-minor but impact to a specific soil may be adverse-major.

TABLE V-1 (Page 1 of 3)

Residual (after mitigation) Impacts of Major Timber Management Activities on Selected Environmental Components

Existing Environmental Component Impact	Chemical Weed Control		Chemical Hardwood and Brush Control		Chemical Baiting		Chemical Control of Insect and Disease		Fertilization	
	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	–	0	–	0	☒	☒	–	0	+	0
Air	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Ecological Interrelationships	–	0	–	0	–	0	–	0	–	0
Recreation (general)	–	0	–	0	☒	☒	+	0	☒	☒
Recreation (fishing)	–	0	–	0	☒	☒	–	0	☒	☒
Recreation (hunting)	–	0	–	0	☒	☒	–	0	☒	☒
Soils	–	0	–	0	☒	☒	–	0	+	◒
Vegetation (health and vigor)	–	◒	–	◒	☒	☒	+	●	+	●
Vegetation (diversity)	–	◒	–	◒	☒	☒	☒	☒	–	0
Water (quality)	–	0	–	0	–	0	–	0	–	0
Water (yield)	+	0	+	0	☒	☒	☒	☒	–	0
Wilderness experience	–	0	–	0	–	0	–	0	–	0
Wildlife (raptors, lafge predators)	–	0	–	0	–	0	–	0	☒	☒
Wildlife (herbivores)	–	◒	–	◒	–	0	☒	☒	+	◒
Wildlife (aquatic)	–	0	–	0	☒	☒	–	0	–	0
Socio-Economic	+	0	+	0	+	0	+	◒	+	◒

Legend:

Impact
– = adverse
+ = favorable

Magnitude
0 = minor
◒ = moderate
● = major
☒ = little or no impact

TABLE V-1 (Page 2 of 3)

Residual (after mitigation) Impacts
of Major Timber Management Activities
on Selected Environmental Components

Existing Environmental Component Impact	Clearcutting and Seed Tree Cutting		Shelterwood and Commercial Thinning		Selection Cutting		Precommercial Thinning		Road Construction	
	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	-	◐	-	0	-	0	-	0	-	◐
Air	-	0	-	0	-	0	-	0	-	0
Ecological Interrelationships	-	◐	-	0	-	0	-	0	-	◐
Recreation (general)	-	◐	-	0	-	0	-	0	+	◐
Recreation (fishing)	-	0	-	0	-	0	-	0	-	◐
Recreation (hunting)	+	◐	+	0	+	0	+	0	+	◐
Soils	-	0	-	0	-	0	-	0	-	◐
Vegetation (health and vigor)	+	◐	+	◐	+	◐	+	◐	-	●
Vegetation (diversity)	+	◐	+	0	+	0	+	0	-	◐
Water (quality)	-	0	-	0	-	0	-	0	-	◐
Water (yield)	+	◐	+	0	+	0	+	0	+	0
Wilderness experience	-	●	-	◐	-	◐	-	0	-	●
Wildlife (raptors, lafge predators)	-	◐	-	0	-	0	+	0	-	◐
Wildlife (herbivores)	+	◐	+	0	+	0	+	0	-	◐
Wildlife (aquatic)	-	0	-	0	-	0	-	0	-	◐
Socio-Economic	+	●	+	◐	+	0	+	0	+	●

Legend:

Impact
- = adverse
+ = favorable

Magnitude
0 = minor
◐ = moderate
● = major
☒ = little or no impact

TABLE V-1 (Page 3 of 3)

Residual (after mitigation) Impacts of Major Timber Management Activities on Selected Environmental Components

Existing Environmental Component Impact	Tractor Logging		Hilead Logging		Skyline Logging		Ballon Logging		Slash Burning	
	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude	Impact	Mag-nitude
Aesthetics and Human Interest	-	0	-	0	-	0	-	0	-	0
Air	-	0	-	0	-	0	-	0	-	0
Ecological Interrelationships	-	0	-	0	-	0	-	0	-	0
Recreation (general)	-	0	-	0	-	0	-	0	-	0
Recreation (fishing)	-	0	-	0	-	0	-	0	-	0
Recreation (hunting)	+	0	+	0	+	0	+	0	+	0
Soils	-	0	-	0	☒	☒	☒	☒	-	0
Vegetation (health and vigor)	-	0	-	0	-	0	-	0	-	0
Vegetation (diversity)	-	0	-	0	-	0	-	0	-	0
Water (quality)	-	0	-	0	-	0	-	0	-	0
Water (yield)	+	0	+	0	+	0	+	0	+	0
Wilderness experience	-	◐	-	◐	-	◐	-	◐	-	◐
Wildlife (raptors, lafge predators)	☒	☒	☒	☒	☒	☒	☒	☒	-	0
Wildlife (herbivores)	☒	☒	☒	☒	☒	☒	☒	☒	-	0
Wildlife (aquatic)	-	0	-	0	-	0	-	0	-	0
Socio-Economic	+	0	+	0	+	0	+	0	+	0

Legend:

Impact
- = adverse
+ = favorable

Magnitude
0 = minor
◐ = moderate
● = major
☒ = little or no impact

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2. Megahan, Walter F., and Walter J. Kidd, Effects of Logging Roads on Sediment Production Rates in the Idaho Batholith, USDA Forest Research Paper INT.-123, 1972, pgs. 8 and 9.

VI. SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Timber management is not a short-term use but a continuous use which involves different practices applied to different parts of the forest over time, the magnitude and frequency of which is dependent upon the intensity of the program. Most of the individual practices carried out on a particular area do imply a short-term use. However, the time frame used in this statement in identifying the long-term impact is relatively long, extending to 100 years, in order to equate the timber management cycle to the approximate rotational period of tree harvest. This is because trees are the predominant life form of the forest and the primary support to the productivity of the biotic community.

A. Ecological Interrelationships

The productivity of an impacted area will be significantly reduced in those instances where permanent structures (primarily roads) are constructed, bare rock is exposed or unstable soil conditions exist. However, if the productivity of an ecosystem is defined in terms of the biomass it produces, the overall impact of timber management will be to increase the productivity of the forest by replacing slow growing overmature stands with fast growing young stands. The practices associated with the growing and harvesting of a renewable resource increase the yield of wood material along with some other environment components such as certain wildlife species, over what nature alone can produce. The continual removal of the nutrient containing resource over successive rotations, and the practices to which the land is subjected, may have a dampening effect on productivity over time. If so, this effect will be offset by artificially introducing nutrients through fertilization. Long-term ecological interrelationships will be affected as a result of establishing new disclimax species and seral stages.

Highly productive ecosystems, such as the Northwest Coastal Forest, are generally in good equilibrium while the natural balance is fragile in communities of low productivity such as the Taiga and parts of the Montane Forests. Short-term practices pose their greatest threat to the continuing productivity of the latter forests where plant species have low growth rates, and animals have low reproduction rates. If significantly disturbed, such ecosystems recover slowly.

B. Physiography, Geology and Minerals

The construction of roads will expose areas to potential erosion and mass movement which will decrease future productivity on the affected areas by removing or destroying the soil layer upon which new growth is dependent. However, road construction will also expose the underlying rock formations which in turn will give a better understanding of the geology of the area. Thus, long-term productivity will be enhanced to the extent that construction may expose potential economic mineral deposits.

C. Soils

Productivity is reduced when the soil is severely disturbed, eroded or compacted. Productivity loss due to mass soil movement and erosion has the greatest longevity; surface soil disturbance, the shortest; and compaction is intermediate. While some forest development practices such as scarification and burning may have short-term detrimental impacts on localized areas, most practices, such as planting and weed control, will either increase or not affect long-term productivity. The removal of material (trees) by logging could lead to slight reductions in soil nutrition over time. Areas occupied by permanent roads will not be productive during the life of the facility. The possible reclamation of non-essential roads and temporary roads cannot fully restore productivity where extensive cuts and fills exist. In all probability, the full productivity of reclaimed roads and quarry sites will not be restored despite the mitigative measures taken. The potential for decreased long-term productivity, as a result of any management practice that significantly affects vegetal and ground cover, such as fire lines construction, is greatest in parts of the Taiga Forest and the alpine zones of the Montane Forest.

D. Water

Where slopes and stream channels are stable, increased runoff resulting from cutting practices has no adverse effects; and suspended sediment concentrations will remain relatively stable. Periodic erosion along roadways resulting from seasonal rains and storms will reduce the productivity of the aquatic ecosystems for a short period of time. Although localized situations will occur where water quality will be impaired temporarily, timber management practices will increase water yields and will have minimal long-term impact on water quality.

E. Air and Microclimate

The potential long-term impacts of practices which destroy vegetation and/or cause significant soil disturbance on the microclimate of the Taiga Forest are unpredictable as research is lacking. In general, however, the practices associated with timber management will not affect the microclimate or air as they relate to the long-term productivity of the forest.

F. Vegetation

1. Terrestrial Vegetation

The short-term use of the land for timber production will increase long-term vegetative productivity. Vegetation is a renewable resource capable of reestablishment on most areas that are denuded during timber harvest and forest development actions. Through natural revegetation and man-controlled forest development actions, the original productivity of the site can be both restored and increased over time. Timber productivity, especially, will be increased through timber management practices, i.e., development, protection, commercial thinning, mortality salvage, and the timely harvest of the crop prior to the period of naturally declining growth and general stand deterioration due to age and disease. However, where adequate consideration is not given to preserving the environmental conditions necessary for regeneration, and where actions occur that damage or destroy the soil to the extent that technological or economic limitations preclude rehabilitation, long-term productivity will be reduced.

2. Aquatic Vegetation

Timber management practices generally have a minor detrimental effect on the long-term productivity of aquatic plants. In some instances the productivity of plants in standing water habitat will be initially increased for a period of years because of favorable habitat changes. Conversely, massive earth slides in stream channels cause moderate to severe long-term losses in productivity of riparian vegetation. The long-term affect of increased sedimentation from erosion of disturbed soil surfaces is to shorten the natural life span of some aquatic ecosystems.

G. Animals

1. Terrestrial Wildlife

Short-term use of the land for timber production will in general increase the long-term productivity of the forest in terms of terrestrial wildlife. Removal of dense old-growth forests and replacement with new forests having more open conditions (and increased food supplies) will enhance long-term productivity of such species as deer and elk. It will also provide for a greater diversity of other wildlife species. An exception to the general rule involves species dependent upon an undisturbed environment where normally short-term impacts on the habitat could reduce future populations. Removal of snags and dead trees will have long-term adverse impacts on wildlife.

2. Aquatic Wildlife

Short-term use of land for timber production will not significantly endanger long-term productivity of aquatic wildlife. Extensive stream channel changes during timber access road construction can cause a significant reduction in aquatic life, including fish, for periods of 20 years or longer. While eutrophication will be accelerated, primarily as a result of road construction, the increase in this natural process will be minimal. Any serious accidents can damage portions of the aquatic habitat; however, widespread or permanent damage of entire river systems as a direct or indirect result of timber management is extremely unlikely. Long-term damage to a major portion of a river could occur as a result of severe sedimentation due to upstream timber harvest and road construction activities.

3. Domestic Livestock

Short-term use of the land for timber production will have little adverse impact on long-term productivity for domestic livestock. Long-term productivity is likely to be increased in those areas where timber and livestock management are judged to be compatible. However, due to the limited use of intensive timber management areas by livestock, this increase will be of minor importance.

H. Micro and Macroorganisms

1. Soil Organisms

Long-term productivity will not be affected except in localized areas where massive soil movement and continuing erosion occur and on permanent road sites.

2. Aquatic Organisms

Measures to mitigate adverse impacts will help maintain the long-term productivity of aquatic life because water quality will generally benefit from these measures. However, unpredictable events and accidents caused by timber management practices will sometimes seriously affect aquatic life in small streams for several years. Effects on long-term productivity of micro and macroorganisms are not known.

I. Human Settlement and Land Use

1. Health and Safety

Due to industrial accidents and accidents involving public and private vehicles, there will be some loss of life and serious injury each year. These deaths and injuries will adversely affect long-term productivity; however, their overall impact on society will be relatively minor.

2. Mineral Development

Timber management actions will have no long-term effect on mineral production.

3. Wilderness

Any timber management practices initiated on wilderness-type areas, especially those of Alaska, will destroy their undeveloped or pristine nature. Signs of commercial human activity will be visible for generations into the future, thereby, limiting future land use flexibility and wilderness potential.

4. Recreation

The effect of any given timber management practice will not seriously impair future recreational values. However, if these practices are viewed collectively as a continuum, recreational values will be impaired to the extent that environmental qualities that some recreationists enjoy are being disturbed (e.g., solitude, tranquility, etc.).

5. Grazing

While livestock will be temporarily dislocated on a short-term basis, potential long-term productivity will generally be increased due to additional forage.

6. Agriculture

There will be no long-term adverse effects on agricultural productivity as a result of practices associated with timber management. In some instances, productivity will be enhanced by increased water yields flowing into irrigation systems.

7. Commercial, Residential and Industrial

No impacts on long-term productivity or potential for the development of these types of facilities are envisioned.

8. Local Government and Public Services

As long as timber management activities continue, some long-term economic effects will be felt by state and local highway departments by way of highway surface wear which will increase their road maintenance and related costs.

J. Aesthetics and Human Interest

1. Aesthetics

On a short-term basis, the harvest of old-growth stands on areas available for timber production (Visual Resource Management classes II, III, IV and V) will adversely affect those people who enjoy viewing large and aged trees. However, on a long-term basis, the replacement of dead and dying overmature stands will increase the visual variety in a forested area. Significant degrees of visual contrast caused by timber management activities may extend far into the future. This will be most prevalent in foreground distance zones.

2. Geologic Human Interest Values

Any action that accidentally obliterates or substantially alters unique geologic features will decrease their long-term human interest values.

3. Archeologic Human Interest Values

Archeological sites and the scientific values contained therein are lost forever once destroyed.

4. Historic Human Interest Values

Inadvertent destruction or damage to historic sites will have long-term impacts. Even with restoration, there will be some diminution in historic value.

5. Ethnic and Religious Values

To the extent that members of a particular group are affected and changed by contact with members of a different culture, there will be some long-term impacts on those individuals. The impact may be particularly significant on the Alaska natives residing in the relatively undeveloped forests of the Taiga Sub-biome.

K. Wildfire

The occurrence of wildfires will often result in the immediate devastation of the biotic community and contamination of the atmosphere by smoke, the magnitude of which will be dependent upon the conditions that characterize the affected area and its size. The short-term use can be described as wasteful consumption; however, long-term productivity is often benefited by improved wildlife habitat and the replacement of overmature decadent stands with vigorous young growth forests. Depending upon the severity of the burn, success in rehabilitation measures and other factors, the rate of recovery will vary with the fraility of the impacted area. In most instances, original productive capacity will be restored, although full restoration may require decades. However in some instances where soil mantles have been completely destroyed, the original productivity of the site will not be restorable within the foreseeable future.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This section is focused on identifying the impacts of timber management from the perspective of irrevocable commitments or losses of resources due to such causes as resource destruction or extraction, massive erosion, destruction of human interest values, elimination of endangered species and their habitat, and irreversible changes in land use. The consideration of any of these consequences is limited to the examination of risks residual after the fullest possible mitigation efforts, previously discussed, have been employed.

A. Ecological Interrelationships

While certain components of the biotic community and physical environment, such as threatened or endangered species, will be irretrievable lost if annihilated by some catastrophic event, the concurrent impact on basic ecological processes will be temporary and in all probability the ecosystem will recover and continue functioning. As stated previously, the ecology of localized areas will be permanently affected because of land slides, etc; however, their rate of incidence and amount of land affected will be minimal. The greatest risk of irreversible damage to the ecosystem, following the loss of vegetal cover and erosion, exists in the fragile areas of the Taiga Forest and in the alpine zones of the Montane Forest. It should be pointed out, however, that much remains unknown regarding the ecological interrelationships that exist throughout the Coniferous Forest Biome. Therefore, absolute certainty cannot be ascribed to the general apparent lack of irreversible or irretrievable impacts.

B. Physiography, Geology and Minerals

Removal of the vegetative cover and the construction of roads will produce an indeterminable amount of localized mass wasting or mass soil movements which cannot be reversed or retrieved, no matter what mitigating measures are taken. Any resulting soil deposition into bodies of water will represent a permanent loss of the soil resource.

C. Soils

The irreversible impact and commitment of the soil resource is closely correlated to the physiographic and geologic factors described above. There are additional impacts, however, if the assumption is made that roads will remain in perpetuity. In this case approximately 2 to 5 percent of the soil surface will be committed to a relatively irreversible use, although the trend towards logging systems which require less road mileage will reduce these percentages in the future. Furthermore, the soil, rock, gravel and other materials used to construct the roads and structures will also represent a form of depletion and a permanent commitment of resources. Conceivably, however, roads could be "dismantled," and returned to the timber production base if society's priorities so dictated. Some soil loss will also occur as a result of water and wind erosion.

D. Water

Watershed values of a drainage are irretrievably committed, to a degree, in those instances where bare rock is exposed or enlarged by catastrophic soil movements. Landslides will also destroy natural stream channels, resulting in its rechannelization, and concurrently causing permanent loss of soil and other materials.

E. Air and Microclimate

Under extreme conditions, natural restoration of the original microclimate may take a long time, but there will be no irretrievable commitment to any fixed microclimate.

F. Vegetation

1. Terrestrial Vegetation

Except for vegetation directly destroyed or consumed by timber management activities, there are no known irreversible or irretrievable impacts of timber management on vegetation since it is a renewable resource. Even where gross misapplications will cause extensive delays in tree regeneration, natural plant succession and/or new techniques will restore the site to a forest condition. Loss of threatened or endangered plant life or specialized/localized plant associations will constitute an irreversible and irretrievable commitment of the vegetative resources. Where landslides expose rock surfaces, the forest condition will be considered irretrievable.

2. Aquatic Vegetation

The natural process which converts standing water habitats to land masses will be accelerated by those timber management practices that contribute to sedimentation. Massive earth slides are the most drastic events in localized areas, but the cumulative effects of increased sediment from other actions will cause the greatest general impact on aquatic plants.

G. Animals

1. Terrestrial Wildlife

In the course of carrying out timber management activities, some irretrievable losses will occur as a result of animal mortality; however, these losses are not irreversible since wildlife is a self-perpetuating renewable resource.

Very specialized, local and interdependent plant-animal relationships will be destroyed or disturbed to the point of no recovery, thus constituting irreversible and irretrievable resource losses.

Any loss of an endangered or threatened species will constitute a potential irreversible and irretrievable commitment. Small, non-mobile species with limited habitats and only local distributions, e.g., the Larch Mountain salamander, are especially vulnerable; other mobile species with widespread distribution, e.g., the Spotted owl, could be eliminated from a specific area for a long period of time or become threatened in most of its range.

2. Aquatic Wildlife

The most vulnerable aquatic animals are the endangered or threatened species of fishes, the populations of which could be severely damaged and possibly eliminated from an entire river system as a result of a major timber management related accident. Examples include the Colorado River squawfish and the Gila trout of New Mexico. Massive earth slides caused by activities on steep terrain are the best illustration of the adverse effects of heavy sedimentation on a localized area. Aquatic habitat lost in the process is seldom restored by natural means. Earth slides or improper road building activities in colloidal soils around large reservoirs could cause permanent water quality problems in the reservoir and the stream below. Turbid waters are destructive to plants, aquatic organisms and to fish life.

3. Domestic Livestock

There are no known irreversible or irretrievable impacts of timber management on domestic livestock except for the rare instances of animal mortality due to logging truck mishaps.

H. Micro and Macroorganisms

1. Soil Organisms

Based on current knowledge, irretrievable commitments will be limited to localized areas where the soil mantle has been removed as a result of massive soil movements or continuing erosion.

2. Aquatic Organisms

The alteration of habitat conditions will likely favor the existence of one species at the expense of another. Sedimentation due to road building and logging can fill the gravel interstices (spaces) where aquatic insects live. This process can "pave" the stream bottom causing an irretrievable impact on the insect population and will continue until rehabilitation of the stream bed occurs.

I. Human Settlement and Land Use

1. Health and Safety

Accidents that cause permanent injury or death to those employed in the timber industry are irreversible and irretrievable. This also applies to members of the public injured or killed in accidents involving log trucks or other equipment. The attendant monies expended as compensation or welfare assistance represent irretrievable commitments of capital resources.

2. Mineral Development

Common varieties of minerals may be excluded from development in favor of timber production goals, but this would not represent an irreversible action or loss.

3. Wilderness

Commitment of existing de facto wilderness areas committed to timber management will cause an irrevocable loss of wilderness within the foreseeable future.

4. Recreation

Timber management does not commit recreational values to irrevocable loss or degradation. However, at the time a given practice is carried out, some recreational values, e.g. solitude, will be impacted thus causing an irretrievable loss to the individuals affected.

5. Grazing

Some extensive areas of forest range will be committed to timber production; although, this classification does not constitute an irreversible action. Any amount of livestock production foregone, when grazing capacity is affected by timber management objectives, represents an irretrievable loss.

6. Agriculture

Any loss of soil caused by timber management activities will be irretrievable in terms of potential agricultural development of an area. However, such losses will be of minor importance, since most forest sites are unsuitable for conversion to agricultural crops.

7. Residential, Commercial and Industrial

There will be no irreversible and irretrievable loss of lands for these uses.

8. Local Government and Public Services

There are no known irreversible and irretrievable commitments of resources with the exception of manpower or capital expended in the course of maintaining or protecting such facilities as state and county roads used for timber management activities.

J. Aesthetics and Human Interest

1. Aesthetics

Timber management activities will make no irrevocable commitment of aesthetic values. Even old-growth forests could be reestablished if harvesting activities were to be terminated, although this would require several centuries. However, as long as timber management practices are carried out, there will be some irretrievable loss of aesthetic values.

2. Geological Human Interest Values

Accidental damage or destruction of geologic sites will be irreversible and irretrievable.

3. Archeologic Human Interest Values

Inadvertent damage or destruction of archeological sites will be irreversible and irretrievable.

4. Historical Human Interest Values

Once altered, the value of historical sites will be diminished or lost completely. While they could conceivably be restored, their intrinsic, original value will be irretrievably lost and their value to society considerably diminished.

5. Ethnic and Religious Values

Where timber management practices impact ethnic or religious values, the changes in life styles, beliefs or values must be considered as irreversible and irretrievable.

K. Wildfire

Wildfires could conceivably destroy the habitat of endangered species, the species themselves, or man-made structures of historical or archeological significance. Normally, any permanent environmental impact will be limited to those isolated instances where massive landslides have exposed bare rock formations after destruction of soil stabilizing vegetation by fire. The vegetation consumed, the animals killed, etc. represent irretrievable short-term losses of resources.

VIII. Alternatives

A. No-Timber Management Program

This alternative would require the cessation of all timber management practices wherever they are currently being carried out.* While a no-timber management program is an alternative to the current program carried out on Bureau-administered forests in the contiguous western states, it is not an alternative to the current program for interior Alaska. In interior Alaska, more than 99 percent of the forest is undeveloped and untouched by timber management activities. This situation will continue for at least the next ten years. Consequently, this alternative is the program for interior Alaska; and many of its environmental impacts typify the current situation in the Taiga Sub-biome.

It is important to point out that the Bureau-administered lands are intermingled with private or other publicly managed forests, often as small isolated blocks or in a checkerboard pattern of squares 640 acres in size or smaller. Within several years, BLM lands in Alaska may also be intermingled with private and public forests due to selection under the Alaska Native Claims Settlement Act and Alaska Statehood Act. Consequently, even without a Bureau timber management program, the timber management practices carried out by adjacent private landowners or managers will continue to have an impact on the environment of the Bureau-administered forests insofar as road building and log hauling across the public lands and other activities are concerned. However, these impacts are beyond the scope of this statement.

The immediate environmental impact of this alternative will vary somewhat within the three general regions, i.e., western Oregon, interior Alaska, and the remaining western states. For example, the no-timber program will not affect the "natural" undisturbed environment of the interior Alaska forests. On the other hand, the highly developed and intensively managed forests of western Oregon would require many decades to return to a relatively undisturbed state. While recognizing that these kinds of differences do exist, the environmental analysis will primarily stress the long-term effects of this alternative regardless of the locale.

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* It is assumed that some of the protection practices associated with timber management in this statement, such as fire suppression and control and the reforestation of denuded areas, will in all probability continue to be carried out to some extent to protect and enhance non-timber values and uses. It is also assumed that some roads will continue to be built in order to make these values and uses available to the public. Consequently, their environmental impacts would continue; however, their analysis is not repeated under this alternative.

1. Aesthetics and Human Interest

The most significant impact of a no-timber program on aesthetics would be in western Oregon with the cessation of clearcutting on 19,000 acres annually. (Approximately 800 acres are clearcut each year on the remaining forests.) Areas recently harvested could be reforested within 1 to 2 years. The succeeding growth of the trees in the next 10 to 15 years would erase most of the undesirable characteristics associated with clearcut areas. Areas that are designated Visual Resource Management class V (in need of rehabilitation) will not be altered to meet the appropriate class. This will have a major effect by not improving the visual values. This will be especially true in western Oregon and northern California. The natural succession of plant and tree species would take place over time, and the preponderance of over-mature or old-growth stands would be generally pleasing to most forest viewers. Reduced road construction and the elimination of the smell, sound, dust and smoke from other operations will contribute further to the "natural" appearance or mood conveyed to forest visitors.

The increased presence of lightning-susceptible, flammable dead trees or snags resulting from natural mortality, insect and disease infestations together with reduced access resulting from less road construction would increase the risk of natural-caused fires and would adversely affect man's ability to control them. This increased incidence of fire would be offset, in part, by the elimination of fires caused by timber management and the reduction of recreation-caused fires. Nonetheless, the increased incidence of wildfires would significantly impact aesthetic as well as other values. The increase in unharvested, dead trees due to natural mortality and insect and disease infestations would also affect aesthetic values.

2. Air

The cessation of the prescribed burning of approximately 9,000 acres of logging debris each year would eliminate the temporary nuisance of smoke. In general, however, there would be little or no change in air quality under the no-program alternative.

3. Ecological Interrelationships

The basic ecological processes involving the nutrient and hydrologic cycles and the energy flow would be relatively undisturbed. However, natural forces and human activities would continue to influence various components of the ecosystem. The characteristics of its basic living component, vegetation, would change with time following a cyclic, successional pattern. Along with plant succession, the populations and species composition of associated biota would change as the vegetation changes.

4. Recreation

The relatively high quality of undisturbed streams and lakes would appeal to boaters, fishermen and swimmers so long as their accessibility is unimpeded. Conversely, there would be fewer recreational opportunities for hunters since the populations of such predominant game species as deer and elk would be decreased because of reduced food supplies. The reduction in the diversity of animal species due to the elimination of the "edge effect" created by cutting practices would adversely affect some naturalists and birdwatchers. On the other hand, opportunities would be available to observe relatively unique species or habitat associated with unharvested forests. Reduced road construction would eliminate vehicular access to many areas thereby minimizing or precluding some recreational uses and the development of such facilities as campgrounds and picnic areas.*

Many of the recreation-related, environmental impacts would be compensating as far as the various public user groups are concerned. However, this alternative would probably be most favorable to those segments of the public which enjoy the non-commodity values or non-intensive uses of the forest, e.g., hikers, naturalists and wilderness seekers.

5. Soils

Soils would be more stable as a result of little man-caused surface disturbance, and erosion would be limited to localized areas where natural wildfires and slides or slumps occur. Soil compaction would be localized to relatively small areas subjected to intensive human use. Any road construction for the purpose of providing public access or means for transporting private timber would represent the major impact on soil stability.

6. Vegetation

This alternative would result in the preservation or creation, with time, of forests comprised primarily of overmature stands of trees. Whereas current timber management objectives eventually call for the harvest of crop trees ranging from 70 to 120 years of age, no timber cutting would result in the many trees reaching ages of 300 to 500 years or more, after which natural mortality would occur and regeneration would begin.

The pathological or natural rotation of the forest would mean a significant reduction in the production of wood fiber. For example, an acre of trees, harvested over five successive rotations of 100 years each, will grow two to three times as much wood as found on an acre of 500-year-old trees assuming that site quality and growth factors are identical for the two acres.

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* The assumption that fewer roads would be built is based on the fact that the cost of road construction is usually covered by the timber sales program.

There would be a long-term trend towards climax types of vegetation which represent the mature or final stages in plant succession. This evolution would eventually produce, on some sites, vegetative types far different than now exist. Generally, climax vegetation is more tolerant and stable than preceding stages; and the closed canopies of climax types will eliminate considerable vegetation from the forest floor due to competition for sunlight, moisture, and nutrients. Consequently, the Douglas-fir trees that predominate in western Oregon would eventually be replaced with smaller-sized true-fir and hemlock trees.

Windfalls, individual snags, and groups of dead trees would be common. Their deterioration would result in a large amount of debris on the forest floor. This, together with general stand decadence, would increase the susceptibility of the forest to fires, insect infestations and disease. Control of these destructive agents would be hampered in unroaded areas.

7. Water

The closed forest canopies would reduce water yields, particularly from snow zones and from watersheds where summer rainfall constitutes a significant portion of total annual precipitation. Flood and other runoff peak levels would generally be reduced. Water quality would be the highest naturally obtainable; however, the eutrophication of inland waters and estuaries would continue as a result of natural soil erosion. Water temperatures would generally be the lowest obtainable under natural conditions.

8. Wilderness Experience

The absence of commercial timber operations would perpetuate or create, with time, the elements generally associated with the enjoyment of wilderness values. Many of the vast and undeveloped forests of interior Alaska could qualify for inclusion in the formal wilderness area system. However, even with the eventual erasure of the signs of timber management activities from the other Bureau-administered forests, it is doubtful that forest areas outside of Alaska would qualify as wilderness under present legal criteria, primarily because of the development of the intermingled private lands.

9. Wildlife

The elimination of thinning and harvesting practices on approximately 100,000 acres annually would have an adverse impact on those wildlife species which require low-growing vegetation as a source of food or habitat. Consequently, reductions in the populations of such animals as deer, elk, rabbits, band-tailed pigeons and ruffed grouse could be expected. On the other hand, old-growth forests would support greater populations of small birds, squirrels, insects and other organisms that inhabit the high foliage canopy or the soil. The existence of snags and deadtop trees would improve the habitat for such wildlife as eagles, hawks, owls and woodpeckers by serving as nesting and perching sites and as food sources. Furthermore, the undisturbed forest would provide more suitable habitat for species which are particularly sensitive to human activities such as the spotted-owl, lynx, cougar and marten. Generally, however, the more uniform canopy cover of the undisturbed forest, with less "edge" between different vegetative types of canopies, would tend to produce a lesser variety of both flora and fauna than a forest under timber management.

In general, water quality would be maintained at a high level with resulting benefits to aquatic wildlife. Due to reduced surface runoff, stream sedimentation would be generally limited to natural eutrophication; and aquatic habitats would, thus, tend to be more stable. However, stream debris in the form of windthrown and fallen timber would increase and somtimes would create impassable barriers to the passage of such anadromous fish as salmon and steelhead.

10. Socio-Economic

The local socio-economic consequences of this alternative would be most severe in western Oregon where the annual production of approximately 1.2 billion board feet represents 17 percent of the total timber that the region produces. Approximately 13,500 primary timber-related jobs and 20,000 secondary jobs (retail trade, service, etc.) would be lost. These jobs represent 8 percent of the total employment regionally and as much as 35 percent of the total employment in some local areas. The impact in Alaska would be inconsequential while in the other states the production foregone in an amount up to 130 million board feet could involve the loss of some 2,000 primary and secondary jobs.

While some opportunities for geographic relocation and other sources of employment might be available, it could be expected that unemployment with its attendant social and economic hardships to individuals and communties could occur. This would be slightly offset by a corollary reduction in industrial accidents and their social and economic costs.

At the national level, the annual timber production foregone in the amount of 1.3 billion board feet, representing 3 percent of total U.S. softwood production, would widen the existing and projected gaps between supply and demand. Since Bureau-produced timber is primarily processed as lumber and plywood for housing purposes, approximately 100,000 fewer housing units would be constructed each year unless other sources or types of material were made available (these possibilities are discussed in subsequent sections). Furthermore, a reduced supply of raw material could be expected to increase timber prices, thereby, increasing housing costs. The revenue lost to the U.S. Treasury and applicable local governments from the sale of timber would total about $150 million annually while the savings in the annual appropriations necessary to carry out the program would be about $20 million dollars, based on 1974 levels.

The socio-economic impacts of a no-timber management program could conceivably be offset, in part, by any gains in non-timber related forest uses and values such as increased recreational use. These gains could stimulate or increase corresponding forms of economic activity; however, the net effect would probably be a significant decrease in employment and gross national product.

Finally, implementation of this alternative would require research of the legal requirements for the multiple-use management of the public lands. Where necessary, applicable laws and regulations would have to be repealed or amended and new enabling legislation enacted.

11. Summary

The environmental impacts of the no timber program alternative are summarized in Table VIII-1 located at the end of Chapter VIII. This table provides a capsule view and ready comparison with a similar displays of impacts for the proposed program described in Chapter I and other selected program alternatives described in this Chapter.

In analyzing the tabulated impacts, the reader should keep in mind that some individual timber management practices may have a different kind or magnitude of impact on an environmental component than the aggregated impact shown for the program. Also, individual elements comprising an environmental component may be impacted in a different manner or magnitude than indicated for the total environmental component listed.

B. Expanded Timber Management Program

This alternative would involve the expansion of intensive forest management activities beyond those of the proposed action. Under this alternative, timber management activities would be permitted on all Bureau commercial forest lands irrespective of other resource uses and needs, including environmental protection and enhancement. Management activities, i.e., harvesting, thinning, brush and hardwood control, stand conversion, etc., would be intensified to produce the maximum sustained-yield of forest products.

A harvest program consistent with the principles of sustained-yield would permit the harvest of an additional 48 million board feet annually from nearly 200,000 acres of western Oregon commercial forest lands currently withdrawn from timber production or restricted to modified (reduced) harvest levels due to other resource needs and uses (e.g., recreation, scenic corridors, buffer strips, etc.). Additionally, an undetermined amount of volume could also be harvested from other western Oregon lands capable of producing commercial timber crops but which are withdrawn from timber production because of fragile site conditions (i.e., environmental values).

Annual harvest levels from the remaining forests could be increased from the current 130 million board feet to approximately 230 million board feet, also due to the lifting of timber management restrictions.*

Alaskan forests would also be developed and intensively managed for timber production. Yields from these forests, however, would be speculative since the Alaskan Statehood Act and the Alaska Native Claims Settlement Act will continue to have a marked influence on the Bureau's ability to intensively manage these forests during the decade.

1. Aesthetics and Human Interest

The adoption of this alternative would increase the total area clearcut each year in western Oregon from 19,000 acres to approximately 23,000 acres. With this increase, there would be a corresponding adverse impact on aesthetics caused by disruption of foreground, middleground and background views. Visual impacts caused by increased clearcutting and road construction would especially be noticeable to air travelers. The noise and dust associated with increased cutting, logging and transportation would interrupt the serenity of the forest. Dust on road-side vegetation would be offensive to recreationists driving for pleasure. The incidence of wildfires caused by logging and intensified by logging debris would be more pronounced, thus, impacting the "senses" of mood, sight and smell.

Harvesting of timber from all commercial forest lands would permit removal of stands of trees killed by disease, insects or fire, thus, improving the view for some.

The replacement of old-growth timber with young-growth stands, however, would unfavorably affect those persons who enjoy the aesthetic values provided by large, old trees. Cultural resources would likely be impacted by the loss of an undetermined number of valuable sites.

2. Air. Accelerated harvesting and site preparation activities would likely necessitate an increase in the burning of logging debris, thus impacting air quality. The resulting smoke would constitute a health hazard or nuisance to local inhabitants during several months of the year, primarily in western Oregon. Fugitive dust from road construction, logging, quarrying and transportation activities would also present local air-quality problems.

* Although the Bureau is currently harvesting 50 million board feet annually from these lands, preliminary data indicates that the remaining forests (forests outside western Oregon and excluding Alaska) could support an annual allowable cut (within the principles of sustained-yield and multiple-use) of approximately 130 million board feet annually. Thus, the net increase of 100 million board feet (230-130) would be at the direct expense of multiple-use management concepts and environmental protection and enhancement.

3. Ecological Interrelationships

Ecological interrelationships would be severely impacted under this alternative as more land and attendant flora and fauna would be subjected to the disruptive intensive forest management practices. As in the proposed action, timber management would result in the formation of man-caused seral stages, thus, excluding large numbers of species in favor of a few. The tendency toward monoculture would be pronounced since increased clearcutting, planting of genetically improved stock and expansion of harvesting to all commercial forest lands would reduce the available natural seed sources. Old-growth stands would be replaced by young-growth timber over an approximate 20-year period in western Oregon and a 40-year period in the remaining forests of the contiguous 11 western states.

The removal of old-growth forests and management of subsequent timber crops on short rotation periods (i.e., 85 years) would be accompanied by a reduction in the numbers of wildlife species relying on old-growth forests for food and cover. In some cases, certain species could be eliminated from a portion of its range. Alteration of the forest ecosystem could lead to an entirely different species population - insect, animals and plants - that thrive in young-growth forests.

4. Recreation. The water quality of streams and lakes would be degraded significantly due to expanded logging, road construction and use of chemical pesticides. This in turn would alter the aquatic ecosystem and would ultimately serve as a detriment to fishermen, swimmers and boaters. Elimination of sport fisheries in certain localities would also be a distinct possibility. Recreation use, especially that in established camping, boating, hiking or picnic areas, would be impacted during the logging operation and the scars of logging would remain for several years. Potential recreation sites would also be logged, thus, adversely affecting their value as future recreation areas.

The "edge effect" created by expanded harvesting and management activities would provide favorable food and cover conditions for a variety of wildlife. Though certain animal populations such as deer may increase, this effect would be offset by reduced populations of bear, elk and other game animals inclined toward an undisturbed environment. Collectively, the impacts to recreational hunting would be adverse.

Increased log truck traffic would represent a hazard to forest visitors, and the accompanying dust would be a nuisance to people alongside routes of travel. Recreational use of developed camping and picnicking areas would be adversely impacted by noise, dust and exhaust fumes. The values of certain parts of these areas could be destroyed entirely. Although additional roads would permit greater access to the forest environment, it would be of little value to most recreationists since the primary values of the forest recreational experience would be lost through expanded timber management activities. More extensive and intensive road networks, however, would favor off-road vehicle use.

While expanded timber management activities would increase the possibility of man-caused fires, they would also provide better access for the control of fires.

5. Soil. Expansion of timber management operations to include 49,000 acres of lands withdrawn from timber production would require additional roads which would result in the exposure of the soil to erosive forces. Timber management practices would also be intensified on 154,000 acres currently under modified or restricted management. Additionally, an undetermined acreage of fragile lands capable of producing commercial timber crops would be subjected to road construction and harvesting practices. Exposure of the soil on these sites would accelerate mass erosion processes and eventually lead to the "sterilization" of some sites. Erosion caused by wind and water would also be accelerated.

6. Vegetation. Timber production would be maximized under this alternative. Stand composition and age distribution would be reduced and management activities would favor those tree species having high commercial value. Thus, the interruption of the natural succession would result in man-made disclimaxes and a trend toward monoculture would develop. Consequently, the "artifical" forest could be more susceptible to insect and disease infestation.

Old-growth forests would largely disappear from Bureau-administered forest lands. This loss would be accompanied by a radical alteration of shrubs and herbaceous plants comprising the forest floor. Some plant species could be eliminated from a specific area or portion of its range. Under more severe circumstances, plant species could be eliminated entirely or threatened with extinction.

7. Water. Intensifying the timber management program to include all commercial forest lands would adversely impact water quality. Surface runoff from disturbed areas would increase stream turbidity and raise stream temperatures. The natural rate of eutrophication of water bodies would be increased. Pesticides, i.e., insecticides and herbicides, used to control insect/disease outbreaks or forest development work could be more readily transported from the forest environment to nearby streams and lakes, thus, contaminating these waters.

Essentially, impacts to water quality and quantity under this alternative would be similar to those described for the proposed action but on a larger scale because of the additional acreage subjected to timber management activities (the lifting of management restrictions on 154,000 acres, and the inclusion of an undet erminable number of acres of fragile areas into the timber production base).

8. Wilderness. The expansion of timber management activities to all forest lands capable of continuous production of commercial tree species would preclude the use of these lands for wilderness purposes. Additionally, Bureau lands lying adjacent to existing or proposed wilderness areas or other areas exhibiting wilderness characteristics could also be impacted by timber management operations.

9. Wildlife. As with the proposed action, nearly all wildlife would be initially affected by timber harvesting and road construction practices. The removal or destruction of habitat, particularly old-growth forest, would result in the displacement or loss of wildlife. This impact would be most noticeable and severe for those species (owls and raptors) requiring old-growth timber for food and cover. Deer, rabbits, ruffed grouse and certain other species would respond favorably to the removal of timber and the subsequent increased availability of nutritious browse, grass and forbs. "Edge effect" would be maximized. Species such as elk would be adversely impacted under an expanded timber management program since critical habitat areas, i.e., food, cover and calving, would be subjected to forest development and harvesting activities. More extensive and intensive road networks would lead to increased harrassment of wildlife, especially from off-road vehicles.

Rodent populations, including ground-dwelling squirrels and mice, would benefit from brush regeneration following logging. Consequently, predators of these rodents would also benefit.

Aquatic animals would be adversely impacted by increased stream temperature, oxygen content and turbidity. Logging debris would block streams and would retard the migration of anadromous fish to spawning areas. Sedimentation could also adversely impact fish production by covering spawning gravels. Pesticides and other chemicals used in forest development operations could degrade water quality and cause radical changes in lake, stream and river ecosystems.

10. Socio - Economic. Generally, an increased allowable cut would have a favorable impact on local economies. The harvesting of an additional 70 - 100 million board feet annually would return an additional $8 - $10 million dollars from the sale of timber (based on 1975 selling prices). An increased harvest would also increase the number of primary and secondary jobs, thus, aiding in the stabilization of wood-dependent communities.

11. Summary. The environmental impacts of the expanded timber management program are summarized in Table VIII-1.

C. Limited Timber Management Program

There is an infinite number of program levels under which a forest can be managed and a corresponding number of production levels. Any attempt to identify all of such levels and to describe their various environmental impacts would be difficult at best and probably meaningless. Consequently, this alternative was selected because it falls about midway between a no-timber management program and an intensive timber management program. It typifies timber management designed to produce a sustained-yield of timber at a level consistent with minimal capital investments. Consequently, the practices included under this alternative are limited to (1) the cutting, logging and transportation of mature trees, (2) road construction and maintenance and (3) protection.

The adoption of this alternative would result in a significant reduction in the intensity of the western Oregon program and its corresponding level of production. While a limited program generally approximates the current program for the remaining forests in the contiguous United States, its adoption would halt the trend towards more intensive management of the forests classified as available for timber production. The possibility of adopting of this alternative for 99 percent of the undeveloped interior Alaska forests is largely academic since these lands are far removed from existing markets and are expected to remain economically inaccessible during the current program period.

One of the overall effects of the limited program alternative would be to minimize, at any given point in time, the occurrence of the environmental impacts of timber management practices. Besides the obvious fact that this alternative would employ considerably fewer practices, a second impact-minimizing factor would be involved. Due to the reliance on natural regeneration for restocking (often requiring 10 to 15 years or longer than artificial regeneration), the number of years necessary for cut-over areas to produce trees, ranging from an average of 83 years in western Oregon to 120 years of age in the other regions, would be lengthened accordingly. As a result, the total area cut and logged each year would be about 15 percent smaller due to the reliance on natural regeneration.

A second overall effect on this alternative would be to minimize the frequency of the environmental impacts of timber related activities on a particular area over time, thereby, providing a maximum period for the site to recover from any disturbance incurred. In forests under an even-aged management system, a timber stand would be entered only once during its rotation of about 100 years (in the case of clearcutting) or two to three times in the space of 10 to 30 years (in the case of seed tree and shelterwood cuttings). Forests under a many-aged system of management could be subjected to selective cutting as frequently as every 20 years or less.

Combining the foregoing elements of geographic dispersion and frequency, and assuming an average timber rotation of 100 years and a 50-year road development period, the area of forest land directly impacted each year by clearcutting (if applicable), logging and road construction practices under the limited alternative would be about 1 percent of the total forested area whereas it could eventually reach 12 percent under an intensive program. The percentages would be higher where stands were subjected to other cutting systems; however, the impacts on individual cutting units would be less.

Road construction, acknowledged to be the most damaging practice in terms of soil erosion and stream sedimentation, would proceed more slowly under this alternative than under an intensive program level. Its impacts would thereby be dispersed over time. Current road construction rates in western Oregon of 400 miles a year would be reduced to about 300 miles. This alternative, like the intensive program, would eventually result in a fully developed, permanent road system occupying approximately 5 percent of the forest land base. The trend towards more far-reaching logging systems (helicopters, skylines, etc.), however, would probably reduce this percentage.

Despite the mitigative measures employed in the course of land use and timber management planning, some segments of the public would be adversely affected because of the manner in which the practices employed under this alternative would be carried out, or because of their mere implementation. In this respect, there would be little difference between the limited and current timber management programs since both include similar levels of two of the most controversial practices: clearcutting and road construction.

1. Aesthetics and Human Interest

The adoption of this alternative would have its greatest impact on aesthetics in western Oregon by reducing the total area clearcut each year from 19,000 acres to approximately 13,000 acres. The replacement of old-growth stands with young stands on lands available for timber production would adversely impact those persons who enjoy large and aged trees; however, the converted areas would add visual variety to the landscape, thereby, increasing visual values.

The noise and dust associated with cutting, logging and transportation practices would interrupt the serenity that is often sought in the forest. While infrequent, wildfires caused by timber management activities would occur and would significantly impact aesthetic as well as other values.

Because they are often difficult to recognize or locate, archeological sites could be destroyed.

2. Air

The present impact of the prescribed burning of logging debris on air quality would be further minimized with the reduction of the acreage treated from 9,000 acres annually to 6,000 acres. The resulting smoke would sometimes constitute a minor nuisance to local inhabitants during a few months of the year, principally in western Oregon.

3. Ecological Interrelationships

With time, the ecosystem on all lands available for timber production would continue to be affected since every acre would be disturbed to some degree. The ecosystem of a particular area would be affected on a cyclic basis (once every 100 years on the average) when harvesting operations take place. As a result, there would be impacts on components of the ecosystems resulting from soil erosion, stream sedimentation, and vegetal destruction on individual areas throughout the forest every year.

The basic ecological processes relating to nutrients, water and energy would recover within 1 to 5 years on most areas due to natural renewing processes; and, in the total forest community, a man-nature induced equilibrium would be established and maintained. However, due to human errors and natural phenomena, there would be continuing instances where the ecosystems of small, localized areas would be so severely impacted that recovery would not take place within decades from the time the impact occurred.

The general character of the ecosystems would be significantly changed by the replacement of old-growth stands (200 years in age and older) with young-growth stands (100 to 120 years in age and younger) on lands available for timber production. The number of years necessary to make this transition would vary from 35 years for western Oregon to 50 to 60 years for the other states.

Consequently, the gradual reduction in the extensiveness of the old-growth ecosystem along with its attendant biotic community would be inevitable. While some members of the community could relocate to old-growth stands not subject to cutting or could adapt to young-growth forests, other members would be unable to adjust and would be reduced in number or distribution or eliminated.

4. Recreation

The reduction in the water quality of streams and lakes due to logging and road construction practices would serve as a detriment to fishermen, swimmers and boaters. Any general recreational use of specific areas would be temporarily disrupted during the period that timber operations are carried out on the area.

The "edge effect" resulting from harvesting practices would provide excellent habitat for many wildlife species. As a result, increased populations of such game animals as deer and elk would be beneficial to hunters while a wide variety of flora and fauna would benefit birdwatchers and naturalists.

Log truck traffic would represent a hazard to public safety, and the accompanying dust would be a nuisance to people on or near routes of travel. On the other hand, roads built for timber management purposes would provide ready access to many areas of the forest having various recreational values and uses which would otherwise be inaccessible to some segments of the public.

While these roads would increase the risk of man-caused fires, they would also provide better access for the control of fires.

As with the alternative of no-timber management, many of the environmental impacts of this alternative would be off-setting as far as the various public user groups are concerned. However, of the two alternatives, the limited timber management program would probably be more favorable to that segment of the public which enjoys the commodity values of the forest, e.g., hunters and fishermen, and those who enjoy the intensive use provided by easily accessible camping areas and picnic sites.

5. Soil

Although this alternative would reduce road construction by about 100 miles annually, the construction of approximately 400 miles of road per year for the next 40 years would continue to represent the most severe impact of any practice on the soil. In the course of developing the road networks, severe vegetal disturbance and earth movement would cause localized soil erosion, compaction and occasional mass soil movement. Logging practices conducted on 60,000 acres annually would contribute (to a lesser degree) to further localized mass wasting, compaction, and soil erosion by water and wind.

6. Vegetation

The productivity of the forest biomass would be relatively high in terms of annual wood-growth when compared to the productivity of overmature, unharvested forests; however, it would be considerably lower than the productivity of intensively managed forests. Maximum productivity would not be achieved because of such factors as the delay or failure of natural tree regeneration on many cutting units, losses due to insects and disease, and the sub-optimum utilization of growing space where timber stands are successfully established.

The natural succession of forest vegetation from pioneer to climax species would be interrupted and in most instances forestalled. To the extent possible, cutting practices that tend to favor the creation of stands of commercially desirable tree species would be used rather than the natural succession of species which occurs under the no-program alternative. Cutting practices and logging and road construction practices would result in severe vegetal destruction and disturbance.

7. Water

Compared to the no-timber management program alternative, there would be an increase in peak flows from fall and spring storms. There would be a lesser increase during heavy mid-winter precipitation, which characterizes western Oregon, since both forested and cutover areas are saturated at this time.

Surface runoff on disturbed areas, principally on those areas disturbed by road construction activities, would accelerate, to a minor degree, the natural rate of eutrophication of water bodies. Occasional mass soil movements would result in above-normal sedimentation, thereby, degrading water quality. However, the impact on the currently limited use of water for human consumption would be nominal or nonexistent. There would be instances when clearcutting would temporarily increase water temperatures due to increased exposure of small tributary waterways to solar radiation. Also, logging debris would temporarily decrease the dissolved oxygen content of streams. Nonetheless, water quality in terms of temperature and oxygen content would remain at a nearly normal level.

8. Wilderness Experience

The construction of roads and timber harvesting activities would result in the alteration of natural, undeveloped forests. This alteration, in turn, would destroy any wilderness-type values that may be associated with "virgin" old-growth forests. Although there would be old-growth forests not available for timber production, their extensiveness would be significantly diminished, thereby, adversely affecting some elements of the public.

9. Wildlife

Nearly all wildlife would be initially affected adversely by timber harvesting and road construction activities. The removal or destruction of habitat, including nesting and escape cover, would result in some displacement or actual loss of wildlife. This sudden impact would be of a relatively short duration. Deer, elk, rabbits, band-tailed pigeons and ruffed grouse would respond favorably to the removal of timber and the subsequent increased availability of nutritious browses, grasses and forbs. Rodents, including ground-dwelling squirrels and mice, would increase in numbers due to brush regeneration following logging. Consequently, small predators that prey on these rodents would also benefit. On the other hand, owls and most raptors and predators would be adversely affected as a result of harvesting activities in their habitats. The land area occupied by roads would permanently remove 5 percent of the land base from wildlife habitat, would encourage harrassment of wildlife through ease of vehicular access, and would reduce the area available to wilderness-inhabiting species.

Natural regeneration of cutover areas and the "edge effect" created by harvesting practices would result in a more diverse habitat that, in turn, would produce a greater variety of birds and mammals.

Aquatic habitat and its respective wildlife would continue to be adversely impacted due to sedimentation and slides emanating principally from road construction activities. Logging debris would occasionally block streams and, dependent upon the time of year, would interrupt or hamper the migration of anadramous fish such as salmon and steelhead. In general, however, the accessibility provided for fishermen by roads would be the only potentially significant impact on aquatic wildlife populations.

10. Socio-Economic

The local, socio-economic impacts of a limited timber management program would have its greatest impact in western Oregon. The current annual production of 1.2 billion board feet from Bureau-administered lands in this region would be reduced by about 35 percent, resulting in the loss of some 12,000 primary and secondary, timber-related jobs. Because of the variation in the dependency of local western Oregon communities on Bureau timber, some would be affected by up to a 12 percent reduction in employment. While opportunities for geographic relocation and other sources of employment might be available, it could be expected that some unemployment with its attendant social and economic hardships to individuals and communities would occur. At a national level, the annual timber production foregone as a result of an approximate 400 million board feet reduction in western Oregon would widen the existing and projected gap between supply and demand. This reduction would also result in increased prices of material. The revenue lost to the U.S. Treasury and western Oregon counties would total $70 million annually, based on the 1974 value of timber sold.

Any geographic expansion of the current or projected program in interior Alaska would provide for increased employment and would help stimulate other forms of economic activity. However, the possibility of this occurring within the next 10 years is doubtful since the forests are isolated and economically feasible means are not available for transporting the raw material to manufacturing or marketing centers.

The adoption of a limited program would dampen the thrust of the programs projected for the remaining forests during the program period. Since the programs for these forests are currently undergoing revision, it is difficult to quantify the impact of this alternative. Nonetheless, a reduction in timber production of approximately 25 percent (or about 35 million board feet annually) could be expected with the attendant loss of some 500 primary and secondary-related jobs. While the production foregone could be judged insignificant, the reduction would contribute further to the overall impact of this alternative on decreased supply and increased product prices.

11. Summary

The environmental impacts of the limited timber program alter-native are summarized in Table VIII-1.

D. Other Timber Harvesting Practices

While foregoing sections dealt with program alternatives i.e., no program, expanded program and a limited program, this section deals with an alternative relating to a modification of the mix of cutting practices to be employed in carrying out the current program. As such, it represents a sub-program alternative that concerns itself with how the program is to be carried out rather than with level of intensity of execution. Basically, this alternative would require the cessation of all clearcutting, except for road construction purposes, and the salvage of stands of timber killed by fire, insects, disease or windstorms.

Currently, the choice of the appropriate cutting practice is dependent upon silvicultural, environmental and economic considerations. In actual practice, all three elements enter into the cutting prescription developed by an interdisciplinary resource team for a given timber stand. On lands available for full timber production, the overriding criterion for the selection of clearcutting is that a high probability exists for the successful establishment and optimum growth of commercial tree species on the cutting area following logging. Consequently, clearcutting is essentially limited to the high-rainfall and highly productive Douglas-fir region of western Oregon.

Units to be clearcut are distributed throughout the forest each year on areas 10 to 40 acres in size, averaging 30 to 35 acres per unit. Clearcuttings may exceed 40 acres in size if necessary to salvage dead or damaged timber following fire, insect or disease outbreaks or windstorms.

The substitute for clearcutting assumed in this alternative is a three-phase partial or shelterwood cutting system which is currently employed to a large extent in southwestern Oregon and elsewhere in the Montane Sub-biome. This practice is usually carried out where site conditions are such that a forest canopy must be maintained until tree regeneration is successfully established. It would involve the removal of approximately 20 to 30 percent of the stand volume during the initial entry and removal of the remainder in two subsequent stand entries, at 15-year intervals. While there are many alternative harvesting techniques, this method was selected because it is technically feasible for most stands in western Oregon and because its application would minimize the adverse impact on aesthetic values often attributed to the practice of clearcutting.

Assuming that the current annual production of 1.3 billion board feet is to be maintained for the current decade, the cessation of clearcutting would require increasing partial cutting in mature age classes to approximately 130,000 acres each year to compensate for the 900 million board feet normally clearcut each year. Practically all of the increased cutting would be the Northwest Coastal Coniferous Sub-biome of Oregon in order to maintain current production levels consistent with the principle of sustained-yield.

Since the timber management practices of the current program would essentially remain the same under this alternative, with the exception of clearcutting, their potential environmental impacts as described in previous chapters will not be repeated. Instead, only incremental changes stemming from increased partial cutting, primarily in northwestern Oregon, will be described.

1. Aesthetics and Human Interest

The unsightly characteristics associated with clearcutting would be localized to areas which have been subjected to the salvage of dead or dying timber. The adverse visual impact of roads would be increased by the acceleration of road construction needed for access to a portion of the 60,000 additional acres to be partially cut each year in lieu of the 20,000 acres currently planned for clearcutting. However, this visual impact caused by roads would be partially offset by their general lack of visibility from a distance due to the absence of clearcut areas adjacent to the roads. The increased logging debris remaining on the forest floor following partial cutting, as compared to clearcutting and burning, would heighten the risk of incidence and the difficulty of controlling wildfires and, therefore, would increase attendant impact on aesthetic and other values.

2. Air

The cessation of clearcutting would almost eliminate the burning of logging debris and, in turn, the release of particulates into the air and the nuisance of smoke to the public during the fall months.

3. Ecological Interrelationships

The transition period from an old-growth to a young-growth ecosystem would be lengthened from 20 years to a minimum of 30 years in northwestern Oregon. The number of acres disturbed each year by the cutting of mature timber would be tripled where partial cutting replaced clearcutting. The impact on the ecosystems of individual areas would be lessened by the removal of only a part of the stand of trees; however, each ecosystem would be disturbed three times over the space of a 30-year removal period. Generally, the impact of partial cutting on ecosystems over time would be less than that of clearcutting.

The adverse impact of road construction practices on the basic ecological processes, in the form of soil disturbance and vegetal destruction, would be increased due to the accelerated road construction needed to gain access to unroaded areas subjected to partial cutting. It is estimated that the current annual rate of 400 miles of road construction in western Oregon would have to be increased to approximately 650 miles annually during the program period under this alternative.

4. Recreation

The occasional reduction in the water quality of lakes and streams, primarily by sedimentation, would be increased by accelerated road construction, thereby, adversely impacting fishermen. Hunters would be adversely impacted by lesser populations of game species such as black-tailed deer, elk, and band-tailed pidgeons resulting from the reduction of food supplies under a partial cutting as compared to a clearcutting. The volume of log truck traffic would remain relatively the same; however, the attendant noise and dust would be distributed over a larger area. Accelerated road construction would increase vehicular accessibility to a greater portion of the forest for the public to enjoy.

5. Soil

The additional 250 miles of road to be constructed each year during the program period would further increase the localized soil erosion, compaction and occasional mass slides brought on by severe vegetal disturbance and earth movement. Soil erosion stemming from cutting and logging on some areas would be lessened with the elimination of clearcutting, but the lessened erosion would be partially offset by the partial cutting of an additionally 60,000 acres annually. The leaching of soil nutrients on partial cutting units would be reduced by the increased litter on the forest floor.

6. Vegetation

The maintenance of a relatively closed canopy for a 30-year period would increase the natural regeneration of such tolerant species as western hemlock, cedar, and vine maple. Along the coastal area, there would be a significant increase in shade-tolerant shrubs and herbs.

The productivity of the forest in terms of net annual wood growth would decrease during the transition to a young-growth forest since the replacement of slow-growing, old-growth stands by faster-growing, young-growth stands would be delayed by at least 5 years. Also, the necessity for carrying the old-growth forest for at least 30 years under the partial cutting system as compared to the 20 years called for in the proposed program would result in less annual volume available for harvest during the transition period. This would be partially offset by the earlier harvest of some dead and dying trees, the volume of which would otherwise be lost, during the initial entry under a partial cutting system. Increased windthrow, particularly following the second entry, and increased insect infestations and disease resulting from old-growth logging debris would further decrease annual net wood growth. Because of the foregoing factors, it could reasonably be expected that the annual production of wood, particularly in the Northwest Coastal Sub-biome of Oregon, would be less, by an indeterminable amount, during the transition period under a partial cutting system.

7. Water

The net result of decreased clearcutting and accelerated road construction would be to increase sedimentation stemming from surface erosion and mass soil movements, thereby, decreasing water quality. The risk of the introduction of chemical toxicants into waterways would be heightened by the increased use of herbicides to control the increased encroachment of brush on cutting units. Water temperatures would remain near normal due to the maintenance of a forest canopy over small tributary streams. Water yields would be decreased slightly as would peak flows from fall and spring precipitation.

8. Wilderness Experience

The accelerated road construction would increase the development of the forest, thereby, increasing the rate of the destruction of wilderness-type values.

9. Wildlife

The initial adverse impact of timber cutting on terrestrial wildlife populations and habitat would be lessened by the removal of trees over a 30-year period, thereby, facilitating the relocation or adjustment of these populations. This benefit would be partially offset by increased adverse impacts and harrassment resulting from increased roads, traffic and people. The increase of vegetative browse species in some areas would benefit deer and elk in those locales. Also, a partial cutting system would provide more uninterrupted protective cover.

Ground-burrowing mammals would generally be adversely affected on a long-term basis while high-canopy species, such as hawks and owls, would temporarily benefit. Accelerated road construction would increase the harrassment of all forms of wildlife through public and vehicular access.

The adverse impact of sedimentation on aquatic habitat and wildlife would be increased by accelerated road construction. However, the maintenance of more normal water temperatures would be beneficial. The risk of accidental spills of chemical toxicants into waterways would be heightened by the increased use of herbicides for brush control, which would increase the possibility of aquatic wildlife mortality.

10. Socio-Economic

The substitution of partial cutting for clearcutting would cause some economic dislocation for the logging industry. In addition to the need for the acquisition of additional or specialized equipment by some firms, the fixed cost of equipment would be more difficult to amortize since equipment would be operated over a larger area and on an increased number of yarding and loading points. In this regard, fixed logging costs would increase due to lower harvest volumes per acre causing appraised stumpage values to be lower which, in turn, could be expected to cause an indeterminable decrease in revenue from timber sales. Concurrently, program costs would increase as a result of the additional time needed to prepare and administer partial cut sales. The increased costs of successfully establishing and maintaining new stands due to brush encroachment following cutting on some areas would also increase program costs.

While the foregoing evaluation of impacts is based on the continuation of the current annual production of 1.3 billion board feet, the substitution of partial cutting for clearcutting would require a temporary reduction in the annual production at some point in time due to the factors identified under the description of impacts on the vegetation component. Consequently, whenever such a reduction were made, other socio-economic impacts such as reduced employment and supply and a further reduction in timber sales revenue would result. However, if the reduction was initiated within the program period, the environmental impacts identified with accelerated road construction under this alternative would be lessened due to the reduction in the number of acres undergoing partial cutting each year.

11. Summary

The environmental impacts of the other timber harvesting program alternatives are summarized in Table VIII-1.

E. Other Domestic Wood Production

The three major administrators or owners (other than BLM) of the 500 million acres of forest land currently classified as suitable and available for timber production in the United States are the Forest Service, private industry, and private non-industry sectors.[1]

Common to all three ownerships is their capability to offset any loss of Bureau production through improved timber utilization. Although considerable progress has been made in this area, an estimated 1,594 million cubic feet of logging residues were left in the woods in 1970. Unsalvaged mortality of widely scattered trees killed by fire or other destructive agents are estimated at an additional 4.2 billion cubic feet. In addition, an estimated one billion cubic feet of manufacturing residues were burned or discarded in the same year.[2] While these statistics include Bureau-administered forests, any advances in better utilization would result in proportionately much greater increases in production from the three major non-Bureau lands since they represent approximately 92% of the commercial forest land base.

Forest Service

The national forests comprise approximately 92 million acres or 18% of the total commercial forest land and are primarily located in the western United States.[3] The western national forests are similar to Bureau-administered forests in terms of species composition and age and in that overmature coniferous stands predominate. As a result, any potential increase in production from these lands could be readily utilized as a substitute for foregone Bureau production in existing structural material and miscellaneous markets. The national forests are also similar to many Bureau-administered forests in having an immediate biological potential for increased timber production if adequate funds and manpower were available to intensify current programs. A recent Forest Service study indicates that, under assumed levels of management, the increased production from the national forests could more than offset the total elimination of the 1.3 billion board feet produced annually from Bureau-administered lands. For any given national forest, the environmental impacts of the individual practices and collective impacts under an intensive timber management program program would be similar to those described in the previous chapters.

Industrial Forest Lands

Forest industries own approximately 67 million acres or 14% of the total commercial forest land, located primarily in the southern and eastern parts of the United States.[4] Substantial progress has been made in this sector in raising the level of timber management during recent years as a result of increased funding of reforestation and other silvicultural practices. Surveys of forest industry holdings in the south, for example, indicated that with the current practices and investment levels most industry lands in this region will be under intensive management by 1980.[5] While there are some opportunities for further intensification, industry lands are generally at a relatively high level of timber management. Concurrently, the industry lands in the Pacific Coast and Rocky Mountain regions are being rapidly depleted of old-growth sawtimber inventories. Projections indicate that sawtimber production from these lands can be expected to decrease through the year 2000.[6] Because of the foregoing factors, it is improbable that industry lands would be capable of offsetting any reduction in the production of sawtimber from Bureau-administered lands on a regional or national level either now or in the near future unless short-term, accelerated cutting of sawtimber was acceptable at the cost of additional, future reductions.

Non-industrial Private Lands

Non-industrial owners hold approximately 296 million acres of commercial forest land representing about 60% of the total, and located primarily in the southern and eastern parts of the United States.[7] These owners consist of farmers, businessmen, housewives, power companies and numerous other occupational groups having widely divergent interests or capabilities to invest funds in timber growing. In reporting on their objectives in owning forest lands, a survey indicated that a minority of the non-industrial private owners sampled had timber production as a principal objective. Most owners indicated that recreation, wildlife protection, aesthetics or speculation were their primary goals. Most had little interest in making sizable investments in timber growing, and some owners were reluctant to harvest timber.[8] These attitudes are supported by the fact that only a small minority have participated in various assistance programs of federal, state and private agencies to intensify the management of their lands. A general conclusion drawn from the survey results is that most owners do not consider timber-growing investments to be sufficiently profitable.[9] Nonetheless, if the non-timber producing segment of this ownership class could be motivated by increased financial assistance, informational and educational programs, or through changes in the economic situation relative to investment profitability, the potential for production from non-industrial private lands could be increased. A recent Forest Service study indicated that 12.7 million acres of non-industrial forest land meeting specified criteria for intensification of management could, as a result of cost-sharing or other incentives, produce an additional 6 billion board feet over the next 50 years. However, harvest increases would be less than 100 million board feet a year for the next 15 years.[10] Consequently, even under optimistic conditions, the potential for the lands in this ownership class to significantly replace any foregone production from Bureau lands in the near future appears to be limited.

F. Wood Imports

Over the last two decades imports of wood products have risen to the point where they now comprise one-fifth of the total supply of industrial wood in the United States.[11] Of this amount, softwood imports reached 5.9 million board feet and accounted for almost 18% of lumber supplies and 29% of pulp and paper supplies in 1970. Most of the imported softwood has been in the form of lumber, coming primarily from Canada. Recent Forest Service projections indicate substantial future increases in Canadian timber product exports to the U.S., particularly if domestic timber prices show appreciable gains. To replace the foregone production of 1.3 billion board feet from Bureau-administered forests would require an increase of imports from Canada of 25% over current levels. About the only other possible source of significant softwood imports is the U.S.S.R.; however, increasing domestic needs coupled with declining resource availability suggests that it is unlikely that Russia will become a major supplier of foreign markets in the near future.

The remainder of the world forests are either predominantly hardwoods, i.e., Asia, Africa and Latin America, or softwood forests which are already heavily utilized. Whether a rise in U.S. imports of either softwoods or hardwoods could be achieved would depend largely on developments in the world timber supply-demand situation and the economic availability from other countries, primarily Canada and tropical areas such as southeast Asia.[12] However, any increase of imported wood would add to the balance of payments deficit which reached a record level of $6.4 billion in 1972.

Regardless of the source of any potential increased imports, the most significant impact of this alternative would be the loss to the U.S. economy generated by the processing of domestic sawtimber into lumber and other products in American mills. This would amount to over $150 million annually. While the importation of logs for domestic processing would preclude this loss, it is doubtful if Canada or other nations would be willing to export part of their economic base.

Relative to a prospective increase of imported wood to offset any foregone domestic production is the alternative of decreased U.S. wood exports. During the decade of the 1960's, over 2 billion cubic feet of logs were shipped to other countries, mainly to Japan, for manufacture.[13] In 1970, 2.8 billion board feet in logs and 1.3 billion board feet of lumber were exported to foreign markets.[14] The reduction or cessation of this activity could more than offset any loss in production from Bureau-administered forests. However, this alternative would further aggravate the balance of payments deficit and would result in some domestic economic implications.

G. Substitute Materials

The consumption of all major categories of industrial raw materials including wood, mineral and agricultural products has increased since 1900. There have, however, been some substantial shifts in the relative importance of the various materials. For example, between the early 1900's and the mid 1950's there was a decline in the relative importance of timber products with their value falling from about 45 percent of the industrial raw materials consumed to around 20 percent. Since the mid 1950's, however, there has been little change with consumption of timber products accounting for about 20 percent of all industrial raw materials used.[15]

Since the decline in the relative importance of industrial timber products in the first five decades of the century was presumably related to relative price changes, the foregone annual production of 1.3 billion board feet from Bureau-administered forests could be expected to result in further slippage in the use of timber products due to increased relative costs and decreased timber production.

Unless offset by increased timber production from other sources, increased substitution by competing materials such as metals, plastics and concrete could be expected to ensue. Considerable substitution of this nature has, of course, occurred in the past. Mineral-based products and steel have made heavy inroads in many traditional wood markets, e.g., the use of plastics for boats, furniture and packaging and, to a lesser extent, steel framing and aluminum siding in housing construction. Technologically, substitute materials could completely replace all current structural uses of wood although the aesthetic values of wood could prove difficult to simulate or replace.

The increased production of many substitute materials to offset 1.3 billion board feet of timber production from Bureau lands could increase the activities and, hence, the environmental impacts associated with mining, extracting and manufacturing processes on air, water and land. Generally, the adverse environmental impacts stemming from the manufacture of steel, aluminum and concrete products in terms of air and water pollution are of greater magnitude than those resulting from the manufacture of lumber and plywood products. In addition, the consumption of electrical energy to produce such materials as steel, concrete, and aluminum would be increased, thus, adding to the current energy shortage. As an example, one report indicates that 39,620 kilowatt-hours are used to produce a ton of aluminum while 936 kilowatt-hours are used to manufacture a ton of lumber. There are likewise substantial differences in heating and cooling costs between houses built with alternative materials. This same report also indicates that the energy needed to heat a wood frame house is 23 percent below that required for a masonry house, and 16 percent less energy is needed for cooling purposes.[16] In view of the costs and capacity for producing energy to manufacture substitutes and the attendant impacts on air, land and water, such differentials as previously mentioned must be considered to be environmentally, economically, and socially significant.[17]

Among other aspects of the question of substitution is the increasing problem of waste disposal. Many substitute materials are not biodegradable, and any additional replacement of highly biodegradable wood products would further aggravate this problem. Finally, the rate of depletion of non-renewable supplies of mineral ores, coal, petroleum and natural gas would be increased with attendant increased dependency on foreign sources for certain of these materials. Forests, on the other hand, constitute a renewable resource that can continue to produce wood indefinitely.[18]

TABLE VIII-1

COMPARISON OF PROPOSED ACTION AND SELECTED ALTERNATIVES (Mitigated Impacts)

Existing Environmental Component Impacted	NO TIMBER MANAGEMENT PROGRAM		LIMITED TIMBER MANAGEMENT PROGRAM		PROPOSED TIMBER MANAGEMENT PROGRAM		EXPANDED TIMBER MANAGEMENT PROGRAM		OTHER HARVESTING PRACTICES	
	Impact	Magnitude	Impact	Magnitude	Impact	Magnitude	Impact	Magnitude	Impact	Magnitude
Aesthetic and Human Interest	+	●	-	0	-	◒	-	●	-	◒
Air	+	0	-	0	-	0	-	◒	-	0
Ecological Interrelationships	+	0	-	0	-	◒	-	●	-	◒
Recreation (general)	+	0	-	0	-	◒	-	◒	-	◒
Recreation (fishing)	+	◒	-	0	-	0	-	●	-	◒
Recreation (hunting)	-	◒	+	0	+	◒	-	0	+	0
Soils	+	0	-	0	-	◒	-	●	-	◒
Vegetation (health and vigor)	-	●	+	0	+	◒	+	●	+	●
Vegetation (diversity)	-	0	+	0	+	●	+	●	+	◒
Water (quality)	+	◒	-	0	-	◒	-	●	-	●
Water (yield)	-	◒	+	0	+	◒	+	●	+	0
Wilderness Experience	+	●	-	0	-	◒	-	●	-	●
Wildlife (raptors, large predators)	+	◒	-	0	-	◒	-	●	-	●
Wildlife (herbivores)	-	◒	+	0	+	◒	+	0	+	0
Wildlife (aquatic)	+	◒	-	0	-	◒	-	●	-	◒
Socio-Economic	-	●	-	◒	+	0	+	◒	-	◒

LEGEND:

Impact

- = adverse
+ = favorable

Magnitude

0 = minor
◒ = moderate
● = major

Note: The individual timber management practices may have a different kind or magnitude of impact on an environmental component than the aggregated impact shown for the program. Also, individual elements comprising an environmental component may be impacted in a different manner or magnitude than indicated for the total environmental component listed.

TABLE VIII-1

Bibliography

1. Forest Services, U.S.D.A., The Outlook for Timber in the United States, Oct., 1973

2. Ibid., Chap. 3, pg. 3.

3. Ibid., Chap. 1, pg. 11.

4. Ibid., Chap. 1, pg. 11.

5. Ibid., Chap. 3, pg. 98.

6. Ibid., Chap. 2.

7. Ibid., Chap. 1, (compiled from Table 3, pg. 11).

8. Ibid., Chap. 3, pg. 96.

9. Ibid., Chap. 3, pg. 97.

10. Ibid., Chap. 3, pg. 103.

11. Ibid., Chap, 4, pg. 126.

12. Ibid., Chap. 4.

13. Ibid., Chap. 4, pg. 127 and Appendix IV (Table VI).

14. Ibid., Chap. 4, pg. 127 and Appendix IV (Tables 7 and 10).

15. Ibid., Chap. 5, pg. 212.

16. Dane, C. W., The Hidden Environmental Costs of Alternative Materials, Minco Report, U.S.D.A.-F.S.-F.E.M.R., unpublished paper 1972.

17. Ibid.

18. Ibid., Chap. 6, pg. 15. p. 221.

IX. CONSULTATION AND COORDINATION WITH OTHERS

A. Consultation and Coordination in Preparing the Draft Environmental Impact Statement.

The draft environmental impact statement was prepared by an interdisciplinary team comprised of individuals from the Bureau of Land Management. Expertise in the fields of forestry, fisheries biology, hydrology, civil engineering, geology, wildlife biology, recreation, minerals, regional planning economics, range management and soils were represented on the team. Additionally, consultation was made with individuals in the Pacific Northwest Forest and Range Experiment Station, Region 6, USFS; Oregon State Office, BLM; and the Montana State Office, BLM during preparation of the draft statement.

B. Coordination During Review of the Draft Environmental Statement.

1. Distribution and from whom comments were requested.

The draft environmental impact statement was filed with the Council on Environmental Quality, March 5, 1975. Notification of its availability was published in the Federal Register on March 11, 1975. Approximately 1,000 copies of the draft statement were distributed to Federal and State agencies, environmental and trade organizations, academic institutions, industrial corporations, individuals and others (Table IX-1). Comments were requested from all recipients of the draft statement. Two months were initially allowed for submission of comments, ending May 7, 1975. The comment period was subsequently extended to June 12, 1975.

2. Written comments received.

Ninety-three (93) documented comments, including those of the BLM, were received as a result of solicitation by news release, Federal Register notice and distribution of the draft statement. It is difficult to estimate the total number of persons represented by these written comments as many letters were from industrial groups, conservation and environmental protection organizations. All review comments received, excluding those of the BLM, are included in subsequent pages of this section. All comments have been considered in the preparation of the final environmental impact statement.

TABLE IX-1
DISTRIBUTION OF DRAFT STATEMENT
AND
FROM WHOM COMMENTS WERE REQUESTED

Internal Review (BLM)

Office in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Wyoming, Denver Service Center, Eastern States Office and Washington.

Other Federal Agencies

Environmental Protection Agency; Department of Agriculture; Department of Health, Education and Welfare; Department of Defense, Department of Commerce; Department of Housing and Urban Development; Bureau of Outdoor Recreation, National Park Service; Bureau of Indian Affairs; Bureau of Reclamation; U.S. Fish and Wildlife Service; Council on Environmental Quality; Advisory Council on Historical Preservation; U.S. Geological Survey; Bureau of Mines; and Department of Transportation.

Organizations

American Forest Institute, American Forestry Association, Conservation Foundation, Environmental Defense Fund, Friends of the Earth, Issak Walton League of America, National Audubon Society, Natural Resource Defense Council, National Wildlife Federation, Sierra Club, Society of American Foresters, Western University and Conservation Association, Federation of Western Outdoor Clubs, Resources for the Futures, National Wildlife Institute.

State Agencies

Department of Conservation, California; Department of National Resources and Conservation, Montana; Department of Environmental Quality, Oregon; Oregon State Department of Forestry; State Forestry Division, Wyoming; Department of Natural Resources, Washington; Department of Natural Resources, Alaska; Colorado State Forest Service and Idaho Department of Public Lands.

Academic Institutions

University of Washington, Oregon State University, University of Alaska, University of Montana, University of California, Berkeley, University of Idaho, Colorado State University, VPI Syracuse University, and University of Wyoming.

Industrial Corporations and Trade Organizations

American Plywood Association, National Forest Products Association, North West Timber Association, Western Forest Industries Association, Weyerhaeuser Company, Georgia-Pacific, Boise Cascade, Potlatch Forests, U.S. Plywood-Champion, Crown Zellerbach, Industrial Forestry Association, Western Wood Products Association and International Paper Company.

3. Summary of Public Response.

Comments were received from a diverse group of individuals, groups, organizations, companies and agencies. Comments ranged from support of the statement to requests for a complete rewrite or curtailment of the Bureau timber management program.

Analysis of the comments revealed, among others, two areas of major concern or questions. These are:

a. The need for additional clarity and comprehensiveness in describing the allowable cut calculation and its relationship to the Bureau Planning System.

b. That the draft Timber Management Programmatic Environmental Impact Statement is too general, covering a wide geographic areas and, thus, suggests the need for additional environmental statements dealing with site-specific impacts.

4. Bureau Responses to Comments.

The foregoing issues along with all others were carefully analyzed and appropriate revisions/changes made to the draft statement. Individual letter comments, followed by the Bureau's disposition and/or response, are presented in the remaining pages of this section.

The following index to the individual letter comments and the Bureau's response is provided for quick reference.

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ADDRESS ONLY THE DIRECTOR,
BUREAU OF SPORT FISHERIES
AND WILDLIFE

United States Department of the Interior
FISH AND WILDLIFE SERVICE
~~BUREAU OF SPORT FISHERIES AND WILDLIFE~~
WASHINGTON, D.C. 20240

In Reply Refer To:
DES 75/10

MAY 14 1975

To: Director, Bureau of Land Management
Deputy Associate
From: Director, Fish and Wildlife Service

Subject: Timber Management Program Draft EIS

We have reviewed the Timber Management Draft environmental statement, January 1975, and offer the following comments:

General Comments

1 - The draft statement seems intended to clarify techniques and timetables involved in implementing foreordained decisions. There is no clear explanation why areas mentioned were selected for intensive timber management. Purpose of the text appears to be relating consequences of a timber management program; not an analysis of whether such management would be the highest and best use of a particular area.

2 - It is apparent that a great deal of time and effort has gone into the statement preparation. However, due to its nature and broad scope, it is somewhat difficult for the reviewer to properly interpret some of the management aspects because of the lack of explanatory material. This is understandable since it evaluates the impact of timber harvest on 23 million acres of commercial forest lands scattered over the Western States and interior Alaska. The draft says under the Introduction, page 1, item 2 of Objectives, that the document will serve as a foundation and framework for subsequent environmental analyses and statements which may be required for a specific timber management program on a State, district, or individual forest area.

3 - On this premise, its treatment of potential impacts on fish and wildlife and related environment is generally adequate. The draft does not mention any surveys to locate nesting sites and dens of endangered species of birds, mammals, and other wildlife. Surveys should be conducted prior to implementation of individual timber harvest plans. Since such species as the southern bald eagle, San Joaquin kit fox, and American peregrine falcon are endangered and inhabit some areas covered by the statement, their nest and den locations may be considered critical habitat within the meaning of Section 7 of the Endangered Species Act of 1973 (P.L. 93-205). Special precautions are required to prevent human disturbance to these animals or their breeding habitat. The Act directs that all Federal departments and agencies shall consider effects on endangered species of actions authorized, funded, or implemented by them.

JOHNNY HORIZON
'76
Let's Clean Up America For Our 200th Birthday

Specific Comments

Section I - TIMBER MANAGEMENT (PROPOSED ACTION)

4 - Page I-2 and I-7. A major impact of the program is the proposed annual construction of 500 miles of roads, 400 of which would be in Western Oregon for a 30 to 40 year period. This could total 16,000 miles of new roads subject to possible erosion. An activity of this magnitude could have very significant environmental effects and should have further elaboration in the draft.

5 - Page I-6. In listing protected acreages, livestock range and critical wildlife habitat areas are combined. The acreages allotted for each of these uses should be stated separately. It should be clarified as to whether old growth stands of Douglas fir are to be included in these "critical habitats." The impression is given that they are not since page I-1 says that in approximately 25 years, the harvesting of old growth timber on BLM lands will be complete in western Oregon.

6 - Page I-35 and I-39. Another activity which could have major impact is herbicidal control of weeds, brush, and hardwoods. For instance, in western Oregon 19,000 acres will be sprayed in 1975 with eight different herbicides. Decreases are expected for subsequent years, but are not quantified. We assume that a separate EIS will be prepared for this action.

Section II. DESCRIPTION OF THE ENVIRONMENT

H. Vegetation, page II-62.

7 - Vegetation zones within the Northwest Coastal Forest sub-Biome (based on Franklin and Dyrness, 1973) 1/ - the *Quercus* woodland type (Oregon white oak, *Quercus garryana*) is omitted. This is a major vegetation type of the Willamette Valley. It also intermingles with the Douglas fir and hemlock zone in the lower foothills of the Coast and Cascade mountain ranges. It could therefore be impacted directly or indirectly by the timber management program, and a discussion of the impacts should be included.

8 - The same omission is true for the juniper woodlands occurring in some areas of the eastern Cascade foothills, and the pinyon pine-juniper woodlands occurring farther east, and farther south in the Montana sub-Biome. These species could be included in the lists on page II-67 (Table III), page II-71 (Table V), and in the discussion concerning these areas, for they also often intermingle with commercial timber species. In general, terrestrial vegetation is adequately discussed and major species are listed.

1/ Franklin, J. F. and C. T. Dyrness. 1973. Natural Vegetation of Oregon and Washington. USFS Technical Report PNW-8.

9 - The treatment of aquatic vegetation is adequate, but no mention is made of riparian vegetation which is not the same as aquatic, as the statement seems to imply. Riparian vegetation (herbs, shrubs, and trees) should be treated as a definite component, and its importance should be discussed.

10- An omission in this section is the failure to mention the existence of unique (endemics, relics), rare and endangered plant species. State lists are now available for Washington, Oregon, California and other western States. 2/

11- The Smithsonian Institute's State-by-State list is also available now. It should at least be mentioned that many unique, rare, and endangered plants occur within the sub-biomes considered.

I Animals - 1. Wildlife Terrestrial

12- Page II-79. Rare and endangered species. A better arrangement would be to list species by sub-biome, rather than for the entire Coniferous Forest Biome. This would avoid repetition.

13- Page II-80 and II-81. a. The Northwest Coastal Forest. Several major groups of animals have been omitted from the representative species list. We suggest the addition of the following:

14- Birds - add warblers, sparrows, finches, thrushes, shorebirds, and waterfowl.

15- Amphibians and reptiles - add toads, frogs, lizards, and turtles.

16- Page II-95. Lichens should be added to this discussion, for they are important as pioneer organisms in succession, as a food source to animals, and as habitat to small invertebrates and micro-organisms.

Section III. Environmental Impacts of Timber Management

17- The basic problem of this section is its treatment of the entire timber management area as a whole. Not even the sub-biome division is used. This type of organization limits description and discussion of impacts to a generalized and often superficial level. While these discussions are generally adequate for some ecosystems, impacts on specific habitats and organisms are either touched on lightly or omitted entirely. It does not deal adequately with localized situations, some of which may be particularly fragile. The value of this section would be increased if the sub-biomes were considered separately.

2/ Dyrness, C. T., et al. 1973. Research Natural Area Needs in the Pacific Northwest - A Contribution to Land-Use Planning. USFS Review Draft Pacific Northwest Range and Experiment Station, Portland, Oregon.

Chambers, Kenton, 1974. Rare and Endangered Plants of Oregon. (Draft). Botany Department. OSU, Corvallis, Oregon.

Report on Endangered and Threatened Plant Species of the United States. 1975. Smithsoniam Institution. US GPO 46-2650

18- Major omissions are both the description and evaluation of impacts upon estuaries, an extremely critical habitat in western Oregon, where the most intensive timber management is presently occurring and will continue to occur. The impacts of logging activities in watersheds draining into estuaries have been severe. Sedimentation and accumulation of organic debris have caused severe losses of mollusc beds and nursery areas for many species of fish, crustaceans, and other marine invertebrates. Increased dredging activities and the entry of chemical pollutants into the water systems also have severe impacts. A discussion of possible effects of timber management on estuaries would seem to be appropriate.

19- The impact of the chemical control program requires a much more comprehensive and in-depth discussion, especially in view of the many thousands of acres which are treated annually in western Oregon. The use of chemical toxicants (herbicides, pesticides, poisons) to control and eliminate certain components of the flora and fauna results in long-term impacts which can be detrimental to non-target, as well as target, organisms.

20- Mention is made of an increase in water yield from areas of timber harvest, but the problem of increased volumes and rates of runoff from recently logged areas is not addressed. This can have a severe scouring effect, and it increases sediment and organic debris loads, thereby adversely affecting aquatic organisms and riparian vegetation where bank erosion occurs.

21- The entire stream ecosystem could be greatly altered if the volume of flow were changed consistently. Impacts would be favorable to some organisms, unfavorable to others.

22- Section III. Environmental Impacts of Timber Management, page III-11, 8. Wilderness Experience. Since timber management would have a major adverse impact on wilderness values, the general treatment of this subject could be expanded. There should be some discussion of BLM lands which may lie adjacent or near to established or proposed wilderness lands in other systems (if any) and a treatment of how potential wilderness areas under BLM management are identified. The draft seems to write off wilderness management.

23- Page III-15 Tabular summary of Environmental Components-Impact-Magnitude. This summary is of little value, as the impacted environmental components which it attempts to evaluate are far too general and inclusive. It should either be eliminated or revised to accurately reflect unfavorable, as well as favorable, impacts.

24- Page III-53, paragraph 2, says that "All development practices have long term beneficial impacts if they work as intended." This would not seem to apply to many species whose populations will be reduced or eliminated, in turn affecting other organisms. Our emphasis is that information is lacking to satisfactorily identify with certainty adverse and beneficial effects of long-term intensive management impacts.

25- The vegetation section does not include acknowledgement of rare and endangered plant species. There are many such species present within the timber management areas, and possible impacts to these populations should be discussed.

26- Page III-63, 7. Impacts on Animals a. Wildlife - Terrestrial. Discussion concerning the use of chemical repellants and toxins to control plant damage by small mammals is quite brief. Addition of more concise information on chemicals, their possible direct and indirect impacts, would be helpful.

27- Page III-66, Cutting Practices. All known species severely impacted by cutting of old-growth forests should be mentioned. This habitat will not be regenerated and effects will be long-term.

Section IV. MITIGATIVE MEASURES TO BE FOLLOWED IN TIMBER MANAGEMENT

28- It is stated that revegetation will be used as a major mitigative measure, which is highly desirable. However, this should be done with native species originally occupying the sites, unless special conditions would make other species more valuable rather than species from other areas or introduced species. When such plants are used, they frequently take over an area and compete with native species thus preventing their reestablishment and adversely affecting organisms dependent upon them.

29- Revegetation should also be practiced when nontarget areas are severely affected by accidental or unavoidable drift from herbicides and other chemicals.

30- Rare and endangered species. Every effort should be made to identify locations of such species, and an adequate buffer strip of vegetation should be left around them.

31- G. Animals - page IV-34-1. Terrestrial Wildlife. The measures discussed are generally adequate for a programmatic statement. The following should also be included: No activity should be conducted that could adversely affect important spawning streams. Every effort will be made to identify and protect rare and endangered species' habitat, and there will be no activity, such as the disturbance of nesting sites, that may cause the failure of reproduction of these species.

32- Page IV-35 states that protection of eagle and osprey nest sites will include preservation of adjacent dead trees and snags used by the birds for perching. We endorse this provision. However, the draft makes no mention on how much area would be protected at each nest site. We recommend that the eyrie of any bird of prey listed as endangered by the Secretary of the Interior be biologically evaluated and protected by establishment of a "critical habitat zone." The actual size and location of such zones should be established by BLM after consultation with personnel from the State fish and game agency and the U. S. Fish and Wildlife Service.

33- Page IV-29, F. Vegetation. The draft says that mitigation for forest development actions will be satisfied by ensuring conditions favorable to tree regeneration on the impacted site. This is a narrow view of mitigation since many other factors should also be considered. Other types of plants should not be excluded completely from regeneration in the area, since diversity is necessary to provide food and cover for a variety of organisms.

34- Page IV-31 and IV-32, Logging Methods. Destruction of herbaceous and shrub layers to enable better tree regeneration cannot be considered "mitigation" - rather, it is an impact in itself, adversely affecting the understory while benefiting early tree regeneration. Mitigation consists of lessening the adverse effect on the understory, not destroying it.

Section V. ADVERSE IMPACTS THAT CANNOT BE AVOIDED

35- Page V-2. A. Ecological Interrelationships. Discussion of restoration times - Not only areas occupied by roads themselves but areas in which natural regeneration time is very slow may be affected to a degree where they will never be restored to original conditions.

36- Gradual demise of old growth forest and its attendant biotic community is acknowledged as a most significant adverse impact in terms of ecosystems. The species affected should be identified to the extent that knowledge permits, i.e., which animals are associated almost exclusively with old growth, which animals may be adaptable enough to relocate successfully, and which ones may perish as a result of old growth removal.

37- Page V-10, I. Human Settlement and Land Use, 3. Wilderness. The draft says that "Timber management will pose no threat of damage to wilderness values of the Northwest Coastal and Montane Sub-biomes; providing unique aesthetic and natural attributes are recognized and protected where they exist." More detailed reasons for this conclusion are needed in considering treatment of wilderness given in III-11. If it is intended here to say that overall there will still be extensive wilderness areas in these two sub-biomes in spite of what happens on BLM lands, it should be clarified. If the implication is that wilderness on BLM lands will not be threatened even with timber management, an explanation of how this would occur appears desirable.

Section VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The following impacts are omitted from the discussion:

Page VII-3, F. Vegetation

38- The loss of an endangered species would constitute an irreversible commitment.

39- Specialized, very local types of plant associations (including those dependent on micro-environments) could be irretrievably lost. While the site would be revegetated, it might not be possible for the original components and their unique interrelationships to become reestablished.

Page VII-4-5, G. Animals

40- It is possible that very specialized, localized, and interdependent plant-animal relationships will be destroyed outrightly or disturbed to the point of no recovery. Such relationships are most likely to occur among invertebrate species.

Section VIII. ALTERNATIVES

41- Page VIII-3, paragraph 2. A.1. Aesthetics and Human Interest. Mention is made that possibility of wildfires will increase due to presence of more dead timber which would be offset in part by eliminating fires stemming from timber management practices. It might be appropriate to include recognition of reduction of tourist-caused fires as a separate entity even though it is probably intended to fall under the category of timber management practices since tourists or recreationists arrive by roads which are a part of that practice.

42- Page VIII-11, Summary. No timber management program. The summary chart indicates that a major adverse effect on the health and vigor of vegetation would result. This may not be true in the general reference context. It would be true only in cases where individuals or stands which had ceased most of their growing activities existed. The health and vigor of many other plants such as hardwoods, shrubs, and riparian and aquatic vegetation would increase in many cases when the adverse effects of herbicide spraying, brush control, increased sedimentation, erosion, and many other adverse impacts of timber management were removed.

43- It is also not necessarily true that there would be a net decrease in species diversity. The variety of trees would eventually increase when planting of monocultures ceased, and previously "undesirable" understory trees and shrubs were allowed to regrow. These impact ratings should be better qualified or more categories should be included so that ratings can more accurately reflect what would occur.

44- The same difficulties pertain to wildlife evaluations, although these are somewhat more accurately rated than vegetational effects. Again, they are too inclusive and do not allow for differences among species.

45- It appears that resonable alternatives have been discussed, but only as complete plans by themselves. The possibility of combining some of the practices of several alternatives into a more workable and practical plan than any of those discussed was not considered. For example, the limited management program, "B," does not have to exclude replanting; the "10-15 year longer wait" for recutting would not then be necessary. Some areas could be managed under an average of 200 or more years' cutting cycle, allowing for the regeneration and perpetuation of old growth forest, rather than managing the total acreage on an 80-100-year period of harvest. Parts of alternative "C" could also be incorporated, whereby clearcutting would cease and shelterwood and selective cutting would take its place, and parts of alternative "D," where greater use of logging residues and manufacturing residues would be made. This could constitute a more complete and efficient use of wood resources, and help to offset some of the loss in timber volume harvested under a more limited management program.

From the standpoint of fish and wildlife, it appears that a combination of the alternatives discussed would have the least overall adverse impacts.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Fish and Wildlife Service, USDI
Washington, D.C. 20240

Paragraph #	Response
1 and 2	As indicated in Chapter I(C), a timber management program is the outgrowth of a process known as the Bureau Planning System which is used to develop and maintain land-use plans for all Bureau-administered lands. Other resource values and uses (i.e., wildlife, recreation) are considered equally with timber in the planning process and in formulating these land-use plans.
3	Surveys of all wildlife habitat, including specific critical habitat of threatened or endangered species on national resource lands, is an integral part of the Bureau Planning System. Additionally, district wildlife biologists will identify these areas in the environmental analyses prepared for the individual timber management activities. In areas of special significance, some contract studies have been negotiated with universities or known authorities to conduct detailed inventories of threatened or endangered species.
4	The time-period to complete the road system in western Oregon has been revised to a more realistic figure of 20 years. Additionally, the effects of road construction have been given greater emphasis in the impact sections, specifically Chapters III and IV. We believe these revisions along with other material in the text adequately discuss the effects of road construction on the environment. It should also be pointed out that the miles of road construction will likely decline with the increased use of more far-reaching logging systems.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
5	The 118,000 acres cited for restrictive timber management activities is in error. These lands are not commercial forest lands and, therefore, have been excluded from the discussion of the western Oregon timber program. These acres, however, are being managed with wildlife (deer winter range) as first priority. Further, old-growth timber will be preserved in scenic buffers, streamside corridors, special research areas, wild and scenic rivers, critical watersheds, fragile sites and other areas withdrawn from timber production.
6	A separate, site-specific, environmental analysis or environmental impact statement, as determined necessary, will be prepared for each project involving the use of herbicides.
7 and 8	Tables II-2 and II-4 (formerly Tables II and IV) list Oregon white oak (*Quercus garryanna*) as a component of the Northwest Coastal Sub-biome and Montane Sub-biome, respectively. Table II-6 (formerly Table VI) lists western juniper (*Juniperus occidentalis*) as a component of the Montane Sub-biome and, although pinyon pine is omitted, we do not consider the omission serious enough to justify revision. The discussion of impacts on terrestrial vegetation does not focus on any particular species but generally covers impacts on all vegetation within the three sub-biomes. In this context, discussion of impacts on any one species would be inconsistent.
9	The final environmental impact statement has been revised to include a discussion of important riparian vegetation.
10 and 11	Chapter II has been revised to reflect these comments. Because of the large numbers of threatened and endangered plant species, specific lists are not included. Acknowledgement of their existence and potential impacts to them, however, is included in the final statement.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
12	Since current lists indicate only eight threatened or endangered wildlife species within the Coniferous Forest Biome, no further subdivision was considered necessary.
13, 14, and 15	Appropriate revisions, as you suggest, have been made to the representative species lists in Chapter II(I)(1).
16	Lichens have been added to the discussion of *Micro and Macro-organisms* in Chapter II of the final statement.
17	We believe the final environmental impact statement adequately addresses and discusses the environmental impacts of the Bureau's timber management activities on a program-wide basis. Analysis of site-specific impacts will be a requisite in preparing environmental impact statements for those sustained yield units identified in Chapter I,D.
18	A discussion of estuaries has been added to the appropriate chapters of the final environmental impact statement.
19	Indepth, comprehensive discussions of chemical pesticides and the impacts related thereto will be handled on a project-by-project basis as indicated for paragraph #6 above.
20 and 21	Chapter III G (formerly III B,7) has been revised to reflect these comments.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
22	The text has been revised to indicate that there will not be any significant impact to existing or potential wilderness areas administered by other federal agencies. Also, the concept of managing Bureau lands for "wilderness" purposes is not "written off" as you suggest. Land-use decisions of this nature, including the designation of lands available for timber production, are made through the Bureau planning process as previously indicated. These land-use decisions are based on multiple-use concepts and consider the views, attitudes, needs, and desires of the public.
23	This table (Table VIII-1) now appears at the end of Chapter VIII, Alternatives, and provides the reader with a ready comparison between the proposed action and selected alternatives. We also believe that this table accurately reflects the cumulative magnitude of adverse and favorable impacts on those general environmental components identified. As stated at the bottom of this table, however, the individual timber management practices may have a different kind or magnitude of impact on an environmental component than the aggregated impact shown for the program. Also, individual elements comprising an environmental component may be impacted in a different manner or magnitude than indicated for the total environmental component listed. Further, the indicated impacts and magnitude thereof may not be applicable on a regional, local, or site-specific basis.
24	This paragraph has been revised to indicate that "*Most* development practices have long-term . . ."
25	As indicated for paragraphs 10 and 11, threatened and endangered plant species and the potential impacts to them have been recognized in the final statement.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
26	As indicated in Chapter I, only those chemicals approved by the U.S. Department of the Interior will be used by the Bureau in its timber management program. The most commonly used (approved) chemicals are listed in Table I-10. Added depth of detail relative to the possible direct and indirect effects of chemicals is beyond the scope of this document. More appropriately, these will be reserved for the site specific environmental impact assessments required for each pesticide project. The text, however, has been revised relative to the use of chemicals and the impacts caused therefrom.
27	Species impacted by timber harvesting operations are included in Chapter III(G), under Cutting Practices.
28 and 29	The Bureau will revegetate with suitable species, when necessary, all areas denuded by any discrete operation associated with the timber management program. Reiteration of this intent for each operational practice would be redundant. Accordingly, the statement has been revised by an appropriate preamble to Chapter IV(F), Vegetation.
30	Chapter IV(G) has been revised to reflect these comments.
31	Mitigating measures for preventing adverse impacts to aquatic wildlife, including anadromous fish, are described in Chapter IV(G)(2). Protection of threatened and endangered species is described in paragraph (G)(1) of this same chapter.
32	Inventoried nesting sites for all threatened and endangered birds of prey are evaluated by the district wildlife biologist. This evaluation is done in coordination and cooperation with state and federal wildlife personnel to determine the size and location of protective buffer zones.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
33	On valuable timber producing sites, successful regeneration of the stand following harvesting is paramount if sustained yield concepts are to be followed. In instances, regeneration efforts may require that valuable wildlife food and cover plants be periodically controlled to reduce competition with tree seedlings. Adequate species diversity, however, will return to the site after it is determined that tree seedlings can survive and grow without further control of competing vegetation.
34	The statement recognizes the beneficial role of understory, shrub and herbaceous vegetation in soil surface protection. To minimize destruction of vegetation where it performs this useful function, the least damaging logging system will be used. The statement further points out, however, that low vegetation may also interfere with regeneration of the forest stand, a basic timber management objective. In order to mitigate this adverse impact on primary vegetation (timber), disruptive logging systems or appropriate forest development practices will be used to regenerate the stand.
35 and 36	The final environmental impact statement acknowledges that "If fragile or sensitive areas are disturbed, the period necessary to reestablish the ecological relationships that existed prior to the action can be lengthy." "Restoration" to original conditions is doubtful under any circumstances or time frames. Representative wildlife species which are associated with old-growth forests are included in the discussion under animals, paragraph (G)(1), Chapter V.
37	Discussions relative to wilderness in Chapters III (I)(3), IV(I)(3), and V(I)(3) have been revised to reflect your comment.
38 and 39	Chapter VII(F)(1) has been revised to reflect these comments.

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
40	Chapter VII(G)(1) has been revised to reflect this comment.
41	Under a no timber management program, the incidence of fire caused by timber management practices (development, protection and harvest) will be decreased because these activities are not being performed except as noted by the footnote (in environmental statement). Recreation caused fires, even though man caused, are not considered a part of timber management practices. The statement has been modified to indicate that there will be a reduction of recreation caused fires because of fewer roads.
42	This tabulated summary has been included in Table VIII-1 for comparison purposes. Also, as indicated in the environmental impact statement, the majority of those lands available for timber production are comprised of old-growth timber which has ceased most of its growing activity and is now in a state of decline. Thus, stand health and vigor is poor.
43	Many of the natural stands on Bureau lands are comprised of a single species. Douglas-fir, for example, is characterized by pure, even-aged stands even under natural conditions and is found extensively throughout western Oregon, often comprising over 75% of a stand. Extensive partial cutting of these near, pure stands should result in more species diversity since shelterwood cutting will favor, for example, true firs and other tolerant species.
44	The depth to which discussion of species and impacts is permitted in the programmatic environmental impact statement is limited. Site-specific and species-specific discussions will be included in the environmental analyses required for each timber management action (i.e., timber sale, thinning project, reforestation project, etc.)

Fish and Wildlife Service, USDI
(Continued)

Paragraph #	Response
45	There is virtually an infinite number of combinations which could be discussed as "alternatives." In reality, however, these variations are not real alternatives but, rather, constitute options within the alternatives or within the proposed action. In selecting the proposed program, it is also pointed out that a rigorous evaluation of optional programs was completed during the planning process, i.e., effects of different silvicultural practices, adjustments to timber production base, etc. These evaluations resulted in the proposed program and appropriate alternatives described in Chapter VIII. Please refer to Chapter I(C) for review of the Bureau Planning System.

United States Department of the Interior
GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

OFFICE OF THE DIRECTOR

DES 75-10

MAY 9 1975

Memorandum

To: Director, Bureau of Land Management

Through: Deputy Assistant Secretary--Energy and Minerals

MAY 13 1975

From: Director, Geological Survey

Subject: Review of draft environmental statement for National Timber Management Program

We have reviewed the subject draft environmental statement as you requested and we offer the following comments.

The environmental statement presents an informative, comprehensive discussion of potential impacts related to geologic conditions and prescribes appropriate measures to mitigate adverse effects.

The statement appears to have adequately considered the possible impacts of the proposed action and the alternative actions upon water resources and related environmental aspects. No serious degradation of the water resources should occur if the corrective measures are implemented as outlined in the report.

1- In the discussion on ground water in the second section, the first paragraph on page II-47 is confusing. The discussion suddenly switches from the Northwest Coastal region of Alaska to the Northwest Coastal region of the lower 48.

2- We are unaware of the basis for the statement on page II-30, "It is unlikely that the other leasable and locatable mineral deposits will occur in areas of primary importance for oil and gas (Fig. 6 & 7)." Our experience shows that other leasable and locatable mineral deposits such as potash, coal, and uranium are found in areas of primary importance for oil and gas. Also, the reference to figures 6 and 7 should go immediately after the statement pertaining to geothermal resources. The potential for oil and gas in the areas under study has largely been ignored in the statement; we suggest a discussion of such potential be included.

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

Henry W. Coulter
Acting Director

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Geological Survey, USDI
Reston, Virginia 22092

Paragraph #	Response
1	Chapter II(F) has been revised to reflect these comments.
2	Chapter II(D) has been revised to reflect these comments. Oil and gas have been specifically included under leasable minerals.

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
WASHINGTON, D. C. 20245

IN REPLY REFER TO:
Trust Services
Forestry
BCCO - 160

APR 17 1975

Memorandum

To: Director, Bureau of Land Management

From: Commissioner of Indian Affairs

Subject: Timber Management Program Draft EIS

1- We have reviewed the draft EIS covering your Timber Management Program. We have only a minor comment. On page I-70 of the addendum (bottom line) you use "470 million" and on page I-76 of the draft you use "450 million" (middle of page).

Other than that we have nothing critical to say about this work. We do believe it is substantial in its coverage of the subject matter. The impacts and mitigative measures have been well developed and presented. It is defensible and your organization should be proud of this accomplishment.

Moris Thompson

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Bureau of Indian Affairs, USDI
Washington, D.C. 20240

Paragraph #	Response
1	Chapter I has been revised to reflect this comment.

United States Department of the Interior
NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:
L7619-MQ

MAY 15 1975

Memorandum

To: Director, Bureau of Land Management

Through: Assistant Secretary for Fish and Wildlife and Parks noted for FW 5-15 RR

From: Acting Associate Director, Park System Management

Subject: Draft Environmental Impact Statement, Timber Management Program (DES 75-10)

We have reviewed the subject statement and have the following comments.

1- The statement should indicate the procedure that will be followed to ensure that the individual actions to be undertaken through the program occur only after adequate consideration of the specific environmental impacts expected has been accomplished.

2- Of particular concern to this agency are potential impacts to units of the National Park System, to properties registered and eligible for registration as National Historic, Natural, and Environmental Education Landmarks, and to properties on or eligible to be listed on the National Register of Historic Places.

3- Further, the statement should indicate the methods to be employed to ensure timely compliance with the Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties (36 CFR PART 800).

Joe Brown

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

National Park Service, USDI
Washington, D.C. 20240

Paragraph #	Response
1	Chapter I(C), Forest Land Use Planning Procedures, describes the process which the Bureau follows to ensure that all components of the environment are adequately considered prior to implementing on-the-ground activities. Included as an integral part of the planning process is the requirement that the Bureau prepare environmental assessments or, as determined necessary, environmental impact statements on each action which has the potential for significantly affecting the human environment. Timber sales, road construction, thinning, reforestation and other related forest management activities are among those actions requiring site-specific environmental assessments.
2 and 3	Chapter III (Unmitigated Impacts), paragraphs I and J describe possible impacts to units of the National Park System and to Historic, Natural and Environmental Education Landmarks. Chapter IV (Mitigating Measures) indicates the methods and procedures which will be employed to ensure reasonable protection for these resource values. Paragraph (J)(3) of Chapter IV has been revised to specify the method by which the Bureau will ensure compliance with the Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties.

United States Department of the Interior
BUREAU OF RECLAMATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO: 746
125.

JUN 18 1975

Memorandum

To: Director, Bureau of Land Management

Assistant
From: Commissioner of Reclamation

Subject: Timber Management Program Draft Environmental Impact Statement (DES 75/10)

By memorandum dated April 1, we provided your office with comments on the subject document. Since that time a much more detailed review has revealed additional comments on the impact statement and we hereby offer these comments for your consideration.

We suggest that the final environmental statement be broken down into
four overall-type environmental statements covering: (1) western
Oregon; (2) California, Washington, eastern Oregon, Arizona and Utah;
1- (3) the Rocky Mountain States covering Colorado, Idaho, Montana,
New Mexico, Wyoming and South Dakota; and (4) interior Alaska. This
would permit more detailed handling of data over areas which one
regional management agency might have jurisdiction and expertise.

Specific Comments

1. Summary, Item 5 - Under the heading "Comments Requested From the
2- Following," the following agency should be added to the list of Federal
agencies: Advisory Council on Historic Preservation.

There was no distribution to entities such as the National Wildlife
3- Federation, Sierra Club, and Timber Association. The Council on
Environmental Quality and departmental guidelines call for complete
distribution to entities such as these for review and comment.

2. Page I-35, Item m - No mention is made of the exact method of
4- application of strychnine on 1,000 acres of land in Colorado. There
also is no mention of the amount that will be applied or the
precautions that will be taken.

5- 3. Pages I-41 through I-72 - Pages within this section have either been omitted or duplicated.

6- 4. Chapter I - While the various practices were adequately described in Chapter I, costs and personnel requirements were not included. It is suggested that these subjects be included in the final environmental statement.

7- 5. Chapter II - The scientific name for each species should be underlined in the text and tables of Chapter II.

6. Pages II-59 through II-61 - Once the scientific name is used in
8- the text, it need not be repeated. Consistency is lacking in this
regard.

9- 7. Page II-78 - The family Cricetidae should be included as a characteristic family of mammals in the coniferous forest biome.

8. Page II-114 - In the second paragraph, line 5, change "stone-
10- clipping" to "stone-chipping." In the fourth paragraph, line 8,
change "archealogical" to "archeological."

9. Chapter III - This chapter has very little quantitative information
to support the conclusions reached on environmental impacts. In
addition, a rigorous analysis of probable impacts is generally
11- lacking. The conclusions reached on impacts often stand by them-
selves without data or rational analyses to support them. The
following comments refer to topics where quantification and analysis
were conspicuous by their absence.

12- 10. Page III-3, Item 1 - Details are lacking on the amount of noise and fugitive dust that will be created.

13- 11. Page III-4, Item 2 - Details are lacking on particulates from burning. Also, details are lacking on the extent of accidents and deaths from burning.

14- 12. Page III-6 - The first paragraph should answer the question "what impacts are expected from roads in heretofore roadless areas?" In the second paragraph, no data were provided to support the conclusion reached on program intensity.

15- 13. Page III-7 - In the first paragraph, we suggest referencing the source of information.

14. Page III-7, Item 4 - No data were presented to support the
16- conclusion. What is the nature and extent of toxicants being intro-
duced into waterways? There were no data to support the conclusion
of a net increase in game populations.

15. Page III-8 - In the first paragraph, the extent of the hazard
17- from log traffic and the extent of the fugitive dust problem should
be described.

18- 16. Page III-8, Item 5 - Describe the consequences of soil erosion, soil compaction, mass land slides, etc., from roads and logging.

19- 17. Page III-9 - In the first paragraph, what is the net loss of soil?

18. Page III-9, Item 6 - There is no quantification of the expected
20- vegetative changes and the net impacts associated with vegetative
changes.

19. Page III-10 - In the second paragraph, a quantification of the net
21- change is needed for water quantity and quality. The expected change
in DO and sediment should be pointed out, and there should be an
analysis of changes in BOD, organic load, TDS, etc.

20. Page III-10, Item 7 - The meaning of the second sentence is unclear.
22- Perhaps an expansion of why peak flows increase during fall and spring
storms, but to a lesser degree in mid-winter, is warranted.

Are there any effects on ground-water storage and its subsequent contri-
bution to surface flows after precipitation has ceased due to the
forest management activities? These, in addition to the increase in
23- peak flows, could cause serious stream channel degradation and bank
cutting if streams should exceed the safe channel capacity. Since the
cumulative effects could result in a highly significant adverse impact
on the major collecting stream in a drainage basin, some assessment
of this impact should be made. Flash floods are mentioned, but not
evaluated, on page V-5, paragraph 2.

21. Page III-11, Item 8 - There are no data on the scope and extent of
24- road construction on "wilderness experience" or identification of
geographic areas where incursion would occur.

22. Page III-11, Item 9 - There is no quantification on the number of
25- acres of wildlife habitat removed or destroyed by the program. Also,
there is no estimate of time involved for a "relatively short
duration."

26- 23. Page III-12 - In the last paragraph, it should be stated that debris will also affect spawning as well as migration.

27- 24. Page III-15 - This table should include streams and stream systems, as related to the physical factors described in the previous comment.

25. Page III-17 - This table needs clarification as to the parameter
28- indicated by the figures. While acreages are mentioned in the text,
the table should be able to stand alone.

26. Page III-63 - As mentioned in line 4, there is no description of
29- the method or amount of strychnine applications in Colorado. Is there
a possibility of ground-water or surface-water contamination, especially
with application following logging?

30- 27. Page III-93, Item 10 (1) - Part of the third sentence apparently was omitted during typing.

28. Chapter IV - Good planning and management criteria for timber
management are in themselves not mitigation. Unfortunately, they are
31- discussed as mitigation in this chapter. As we see it, mitigation is
what is done to reduce the impacts of an active program or project, not
a discussion or analysis of the planning procedures or management criteria.

Mitigative measures are normally incorporated into a project to reduce
or make the overall adverse impacts of a project less severe. An
example that would most likely be identifiable or associated with a
32- timber management project would be the construction of a salmonid (fish)
hatchery to compensate for loss of spawning habitat caused by logging
and road building, which would result in large amounts of undesirable
sediment loads into streams.

29. Page IV-2 - In the second paragraph, you refer to the "National
Environmental Protection Act." Could this be the "National
Environmental Policy Act of 1969?" Add "The Archeological and
33- Historical Data Preservation Act" along with the other acts stated
in this paragraph. It is also not clear what mitigative measures are
required by the laws listed in this paragraph.

34- 30. Page IV-3, Item B - It is not clear when tree improvement, "chipping, seeding, and planting," programs are utilized as mitigation.

Since this is an integral part of the management plan and is considered beneficial, perhaps it should be considered enhancement rather than mitigation.

35- 31. Page IV-10 - In the last paragraph, it is not clear when erosion prevention for stabilization is carried out as mitigation.

36- 32. Page IV-16, Item D - It is not clear how water quality standards "will be met...timber management practice." Moreover, there is no discussion on who will monitor to see that water quality standards are met.

37- 33. Chapter V - Much of the analysis of adverse impacts failed to assess the significance of an impact and, as such, does not define the residuals following mitigation. The following comments are examples of where specific information on the extent of the adverse impact is lacking.

38- 34. Page V-1, Item V - In the second paragraph, the risks discussed were not presented in the environmental impacts chapter.

39- 35. Page V-2, Item A - How long would the gradual demise of the old growth forest take place under typical conditions and what are the net residual impacts in quantitative terms?

40- 36. Page V-3, Item C - In the last sentence, under what conditions would soil erosion occur and what are the adverse impacts?

41- 37. Page V-4 - In the second paragraph, the last sentence, under what conditions would accidental spills occur and what are the adverse impacts?

42- 38. Page V-6 - In the first paragraph, specifically, what are the adverse effects on water; e.g., channel debris, sediment, pesticides?

43- 39. Page V-8 - In the first paragraph, there was no discussion on the impacts associated with weed infestation.

44- 40. Page V-8, Item 2 - In the first paragraph, there was no discussion on decrease in productivity of aquatic vegetation. In the last paragraph, specifically what are the net adverse impacts on terrestrial and aquatic wildlife?

45- 41. Page V-13, Item K - Natural fires are often beneficial and sometimes essential to the natural community and the recycling of soil nutrients, especially in certain coniferous forests. Hence, there may be adverse effects from controlling fires.

42. Page VIII-21, Item 7 - Similar comment made in item 6.

46- In summary, it occurs to us that the statement is rather general and non-specific. If site specific decisions are going to be made, a much more detailed analysis than that represented by this document will be required. Moreover, consultation and coordination with Federal, State, and local agencies will be necessary.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Bureau of Reclamation, USDI
Washington, D.C. 20240

Paragraph #	Response
1	As indicated in Chapter I, the Bureau of Land Management will prepare site-specific environmental impact statements covering each of the sustained yield units in western Oregon. These statements will emcompass over 50% of the land currently in the Bureau's timber production base (excludes Alaska) and 92% of the Bureau's timber production. Additionally, the Bureau will prepare environmental impact statements for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California.
2	The text has been revised accordingly.
3	These organizations were included in the complete distribution list as indicated in Chapter IX.
4 and 5	The text has been revised to reflect your comment.
6	Chapter I states that the cost of carrying out the timber management program is approximately 20 million dollars annually and that the Bureau employs approximately 5,000 persons, 15%-20% of which are directly involved in the timber management program.
7, 8, 9, and 10	Appropriate revisions have been made to reflect these comments.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
11	Site-specific environmental impact statements will be prepared beginning in fiscal year 1977 for each of the sustained-yield units in western Oregon. These impact statements will identify and evaluate impacts on a local/regional basis which will make quantification of impacts easier and more meaningful. Additionally, a site-specific environmental analysis is prepared for each timber management action, i.e., timber sale, reforestation project, thinning contract, pest control project, etc. These analyses quantify site-specific impacts.
12	Quantification of fugitive dust and noise pollution is beyond the depth of the Timber Management Programmatic EIS. Such detail, however, will be considered in preparing site-specific environmental assessments which are required prior to implementing on-the-ground activities. Actions requiring such assessments include timber sales, road construction, thinning, reforestation and other related forest management activities.
13	The complete combustion of forest fuels seldom occurs, and the determination of final combustion products presents infinite possibilities. Chapter III (Impact on Air and Microclimate), has been revised to reflect point source emissions data for forest fuels. Additionally, one authority states that the only penalty inflicted upon the environment by prescribed burning is a small and temporary decrease in visibility. Research work is currently being conducted on smoke emissions from forest burning by the U.S. Forest Service at Macon, Georgia. Statistical information on deaths or accidents caused by smoke from fires is not available.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
14	Chapter III(A) has been deleted to avoid redundancy. Impacts to roadless areas, however, are discussed in Chapter III(I).
15	This material has been deleted.
16, 17, 18 19, 20, and 21	Chapter III(A) has been deleted to avoid redundancy since this material is contained in subsequent parts of Chapter III and in Chapter IV. More detailed discussions of impacts have also been added. As indicated in your summary, however, this environmental impact statement is not intended to be site specific. Therefore, attempts to quantify impacts such as net soil loss on a program-wide basis could result in grossly erroneous and inaccurate conclusions. Quantification of impacts such as these, however, will be considered in subsequent site-specific environmental assessments which will be prepared for each timber management activity significantly affecting the environment.
22 and 23	Chapter III(G) has been revised to reflect these comments.
24	Chapter V(I)(3) has been revised to indicate that timber management activities on BLM lands will not pose a threat to existing or potential wilderness areas. Protection will be afforded through the Bureau Planning System which permits input, review, and comment opportunities for all interested persons, agencies, and organizations. Additionally, all interested parties will be provided the opportunity to review and comment on site-specific environmental assessments prior to on-the-ground activities.
25	See response to paragraphs 16 through 21 above.
26	Chapter III(G)(2) has been revised to reflect this comment.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
27	Impacts on "specific" components of the environment are described in Chapter III. This tabular summary, which has been revised and now appears as Table III-2, indicates the cumulative impacts on general categories of environmental components.
28	The table referred to has been revised.
29	Chapter I(E)(1)(n) has been revised to include the method of application. As stated in Chapter III(D), use of chemicals (including strychnine) has potential for degradation of water quality. Proper application and use of all reasonable mitigating measures, however, will provide little opportunity for massive contamination of surface or ground water resources.
30	The text has been corrected.
31 and 32	As stated in Chapter (I)(C), the Bureau Planning System represents the process in which many of the mitigative measures described in Chapter IV are brought to bear in shaping the timber management program; e.g., planning is the stage at which lands valuable for recreation, wildlife, wilderness, etc. are removed from the timber production base. Thus, good planning has mitigated impacts by prohibiting or restricting certain uses or by blending a variety of resource uses into a multiple-use plan. In this context, it is our opinion that good planning, inclusive of timber management criteria, is properly discussed as a mitigating measure.
33	The text has been revised to reflect these comments.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
34	As indicated in the text, these forest development practices are by their very nature mitigative in the sense that they decrease the potential for erosion and mass wasting by affording or assuring a protective cover for soil. In doing so, they also provide indirect protection to the physiography, geology, and minerals.
35	This paragraph has been expanded to clarify the use of stabilization practices.
36	Chapter IV(D) has been revised to reflect this comment.
37	Two basic objectives of the Timber Management environmental impact statement are (1) to provide a basic and general description of timber management practices and an evaluation of their individual combined and cumulative environmental impacts on a program-wide basis and (2) to serve as the basic foundation and framework for the environmental impact statements and assessments which will be prepared for the timber management programs on a regional/local/site-specific basis. Site-specific decisions cannot be made nor were they intended to be made based on information contained in this document.
38	The final sentence of this paragraph has been deleted since basic assumptions of the program recognize high level planning and environmental protection. Accidents and program modifications resulting from catastrophic events are also recognized within the proposed program.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
39	Chapter V(A) has been revised to indicate that the old-growth forest classified for timber production (full or modified) will be depleted in 20-40 years (20 years in western Oregon and 40 years in the remaining forests). Site-specific impacts, including practical quantification thereof, will be described in the environmental analysis, or as determined necessary, in the environmental impact statements prepared for individual timber sales, reforestation projects, etc. Further indepth analysis and quantification will also be a requisite in the environmental impact statements to be prepared for the sustained-yield units of western Oregon as specified in Chapter I.
40	After applying mitigative measures as described in Chapter IV(C), it is our opinion that residual adverse impacts to soils, resulting from the operations described, will be minimal. For further details on unmitigated impacts and mitigating measures, we refer your attention to Chapter III(C) and Chapter IV(C) respectively.
41	Chapter IV(D) has been revised to reflect this comment.
42	Residual, adverse effects of channel debris, sediments and pesticides are discussed throughout Chapter V.
43	Residual impacts of "weed" infestations will be insignificant since pesticides will be used where necessary to control competing vegetation.

Bureau of Reclamation, USDI
(Continued)

Paragraph #	Response
44	The text has been revised to reflect your comment concerning productivity of aquatic vegetation. Impacts on terrestrial and aquatic wildlife are presented in relative terms to indicate that timber management activities will have net, adverse impact on some wildlife species.
45	The value of fire in ecosystems is recognized. Suppression programs and resource management have contributed to the build-up of fuels in forests, and the increase of fuels will contribute to the large destructive fire. The use of natural-caused fires or prescribed fire to achieve resource management goals must be done under an approved, prescribed plan; and, therefore, suppression actions will occur on fires which do not meet the prescription on areas where fires are not a part of planned management.
46	See response to paragraph 37.

United States Department of the Interior
BUREAU OF OUTDOOR RECREATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

DES-75/10

MAY 14 1975

Memorandum

To: Director, Bureau of Land Management

From: Assistant Director, Bureau of Outdoor Recreation

Subject: Timber Management Program Draft EIS

We have reviewed the subject document in accordance with your memorandum of, March 11, 1975, and offer the following comments for your consideration.

General Comments

We wish to commend the Bureau of Land Management on a well-written comprehensive programmatic statement. The document's treatment of the numerous impacts of the proposed management plan is thorough, objective, and well-organized. The inclusion of footnotes to applicable research and supporting documentation deserves special mention. However, we feel that certain issues still need further clarification in the final statement.

Specific Comments

1- 1. The draft needs clarification on the issue of classification of recreation lands. In the description of the program for Western Oregon (pages I-4 through I-8), the draft indicates that 311,000 acres of commercial forest lands have been excluded from harvest or subjected to modified methods in order to protect environmental values, including recreation. We support this practice, but we are not able to determine the methodology or criteria used by the Bureau of Land Management to classify recreation sites and various scenic areas or corridors. Since timber management practices can significantly impair or destroy recreation values, the final environmental statement should describe the criteria used for recreation land classification in Western Oregon and in the current inventory of the other Western forest lands administered by the Bureau of Land Management. With such information, the reviewer can then determine whether all potential recreational and scenic resources will be given due consideration.

2- 2. With respect to recreation land classification in the Alaskan forests, we note that final inventories have not yet been prepared (p. I-9). Although the Alaskan timber harvests will be relatively small, the selection of sale sites will be based in large part on proximity to markets and available transportation routes. Since demands for recreation in Alaska are likely to be based on ease of access (also using available transportation routes) and proximity to population concentrations (usually the source of local economic demand for timber products), potential recreation values deserve special consideration in any selection of timber sale sites. Recreation land classification should be undertaken in such areas and described fully in the final statement.

3- 3. It would be desirable if more information could be provided on coordination with other related jurisdictions. While it is stated that regional plans developed by Federal, State, local, or other entities have been utilized in the formulation of Bureau of Land Management resource programs, we note that there is no direct reference to the Nationwide Outdoor Recreation Plan, "Outdoor Recreation--A Legacy for America" nor the Statewide Comprehensive Outdoor Recreation Plans. Since impacts of the timber program on recreation and the wilderness experience are summarized as "adverse", we believe the recreation plans would provide useful information--especially in preparing the "mitigative measures" chapter.

4- 4. Maintenance is to be provided to keep roads in a ". . . safe, serviceable condition for use by logging trucks and passenger cars." (p. I-65). Due to the extensiveness of the road system--approximately 500 miles constructed annually--a more thorough description of the future use of roads should be provided. The description might include, for example, an estimate of the extent of continued access, and quantification of continued maintenance for use by passenger cars and recreational vehicles.

5- 5. There is little flexibility in the timing or season for chemical brush and weed control. Since the season for herbicide application (spring, summer, and fall) coincides with the period of maximum recreation use, we suggest that the potential for adverse effects to recreationists resulting from vegetation control should be evaluated in the final environmental statement under Recreation, page III-89.

6- 6. On page III-93, Visual Impacts, the second sentence is incomplete and should be completed in the final EIS.

7- 7. On page III-94, the waste materials mentioned in the second paragraph should not be allowed to remain as "residual litter" following timber harvest. All timber harvet permits should clearly indicate this, and, if necessary, a clean-up bond should be posted by the potential harvester prior to harvest commencement.

8- 8. The discussion of measures to insure the preservation of prime land for wilderness on page IV-47 indicates that "Commercial forest lands unique in character are to be identified and evaluated for withdrawal as natural or primitive areas." This measure should explicitly include all existing roadless areas as well as "lands unique in character."

9- 9. The discussion of mitigative measures for recreation on pages IV-47 and 48 includes some excellent procedures, but clarification is needed concerning classification criteria for "Extensive areas of high recreational values . . . ." which ". . . are to be subjected to special cutting practices if those values would be impaired by normal practices."

10- 10. On page V-10, the section entitled Wilderness should be revised to reflect the fact that the construction or presence of roads is contrary to the definition of designated wilderness lands as given in the Wilderness Act of 1964. This distinction should be made clear in relevant sections throughout the final EIS. Further, the final EIS should note that timber harvesting in areas contiguous to existing or potential primitive or wilderness areas may adversely affect esthetic and/or recreation values in those undeveloped areas.

We appreciate the opportunity to review and comment on the statement.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Bureau of Outdoor Recreation, USDI
Washington, D.C. 20240

Paragraph #	Response
1	Identification, evaluation and classification of recreation sites and various scenic areas or corridors is a function of the Bureaus Recreation Information System (RIS) as described in Bureau Manual 6110. Data gathered in this extensive phase recreation inventory is then incorporated into the Bureau Planning System which is described in Chapter I(C) of the final environmental impact statement.
2	Land tenure in Alaska is changing rapidly due to the Alaska Statehood and Alaska Native Claims Settlement Acts. We, therefore, consider it inappropriate to conduct extensive recreation inventories until such time that land tenure stabilizes. Prior to the sale of any timber from BLM lands in Alaska, however, site specific environmental analysis will be prepared and will, among other things, assess the impact of harvesting operations on existing or potential recreation and scenic values.
3	Chapter I(C) and (F) of the final environmental impact statement describe the means and methods by which the Bureau provides cooperation and coordination with other related or adjacent jurisdictions. With respect to your reference to the Nationwide Outdoor Recreation Plan, "Outdoor Recreation — A Legacy for America", and Statewide Comprehensive Outdoor Recreation Plans, these documents are valuable reference sources used in the preparation of the Bureau Planning System and, ultimately, in reaching land use decisions. Consequently, they are reflected throughout the final environmental impact statement, including Chapter IV, Mitigating Measures.

Bureau of Outdoor Recreation, USDI
(Continued)

Paragraph #	Response
4	Chapter III, Human Settlement-Recreation, has been expanded to include an estimate of the miles of roads which will be maintained as continued access for timber.
5	Chapter III(I) and Chapter IV(I,4) have been revised to reflect these comments.
6	Chapter III(J) has been revised to reflect this comment.
7	Chapter III is describing the unmitigated impacts which will occur as a result of the proposed action. Chapter IV, Mitigation, describes the means by which the Bureau will prevent such littering.
8	Chapter IV(I,4) has been revised to reflect this comment.
9	As previously indicated, classification procedures are a function of the Bureau's Recreation Information System (RIS) and the Bureau Planning System. Describing classification procedures for recreational values is not appropriate within the scope and depth of the Timber Management Programmatic Environmental Impact Statement.

Bureau of Outdoor Recreation, USDI
(Continued)

Paragraph #	Response
10	Chapter IV(I,3) states that "Commercial forest lands unique in character are to be identified in the planning process and evaluated for withdrawal as natural or primitive areas." Development of an area for timber management purposes is, thus, precluded pending evaluation of an area for its wilderness value. We have, therefore, not revised the EIS since construction of new road could not commence until after wilderness values have been evaluated. Areas having existing road systems must also be evaluated, keeping in mind that roadlessness is only one of the many criteria used in judging wilderness values. Chapter III(I,3) has been revised to indicate that timber management activities could impact adjacent, existing or potential wilderness or primitive areas.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Washington, DC 20250

JUN 17 1975
8420

Director (340)
Bureau of Land Management
Department of the Interior
Washington, D. C. 20240

Dear Sir:

The Office of the Secretary has asked the Forest Service to review the draft environmental statement on the Bureau of Land Management's National Timber Management Program sent with your letter of March 20, 1975.

1- We note that authorities, acts, and regulations pertaining to the management of the timber resource are referred to in several different locations in the text. For added convenience it would be good if the table of contents could identify a specific location for these authorities, and have them all collected in one place.

2- There is generally good use made of reference material. We would suggest additional use to substantiate and support, where applicable, the various practices listed under "Forest Development," beginning on page I-30. There are a number of research publications that could be used as references to give added credence to the mentioned operational practices. A good example of where this appears to have been done is the bottom of page I-37.

3- Also, what might the impacts be on rare and endangered species of plants or animals and what provisions would be made for mitigation?

4- There are several areas in the environmental statement that reach conclusions that are speculative in our opinion. These relate to wildlife, the permanence of wilderness, the waste of resources, the expenses involved in maintaining wilderness, harassment of wildlife, and the consequences of erosion and siltation.

5- The coordinated report on timber management activity, (U.S. Government managed, State, industry and other private) does not include assessment of clearcutting or other silvicultural

treatment on the combined holdings. This would appear to be pertinent information in such a broad-based evaluation.

6- The report concluded that it is necessary to tolerate dusty roads and unstable slopes. From an economic assessment this may be true, but from technical feasibility these situations are correctable.

7- Some specific comments pertaining to Alaskan forests are enclosed.

8- In way of a summary, one tabulation showing the various alternatives with their relative impacts on each environmental component would be helpful. The draft presently summarizes each alternative in this general fashion, and it would not be difficult to pull all together in one tabulation to provide ready comparison of alternatives.

We appreciate the opportunity to review and comment on this environmental statement.

Sincerely,

For R. MAX PETERSON
Deputy Chief

Enclosure

Forest Service Comments

9- Page I-9, paragraph 1 - In 1974, 174,000 board feet was harvested from BLM lands in Alaska. This may be small, but it is a large percentage increase over the 1973 cut of 2,500 board feet. This is a result of the pipeline demand. The potential within interior Alaska warrants more discussion. A stewardship and protection philosophy has been sufficient in the past but a management philosophy should prevail in the future.

10- Page I-9 - It is stated that there has been little or no harvesting of timber from BLM lands in the past decade, no timber sales are planned, and many reasons are given for a low rate of potential and development. It should be noted that little or no timber has been made available for commercial development in the past five years or more since timber sales were restricted or denied on public domain by the land freeze leading up to the passage of ANCSA. Since that time, ANCSA has prohibited or discouraged timber harvesting on the d-2 lands, Native lands and other withdrawn lands. Much of the commercial timber in interior Alaska is found on these lands.

11- Page I-28, paragraph 2 - This statement on Alaska is true since it simply states the current policy, but we would not expect this management situation to continue. Silvicultural techniques will be practiced as a forest management program develops in Alaska.

12- Page I-60, paragraph 3 - The potential for development of the interior Alaska forests is here mentioned in the context of rivers as transportation links. This development potential has been overlooked in other assumptions noted elsewhere in the document and on which we have commented.

13- Page II-110, last paragraph - The potential for the future of the interior Alaska forests should be reconsidered in the light of recent developments.

14- Page III-73 - The statement covers all BLM administered lands. This leads to a few questions where statements are made that probably apply to most of the BLM administered land, but maybe not to Alaskan forests. Page III-73 says, "Clearcuttings will have an immediate detrimental impact on water quality in areas where trees adjacent to the stream or river systems are removed." Our Alaskan data does not substantiate this. Another statement which might be misconstrued is on page IV-4, "Clearcutting and seed tree cutting practices are not to be employed on fragile areas having shallow soil mantles, generally 20 inches or less in depth...."

15- Page III-91, last sentence - This may be true, but may not be so in the future. Several areas within Alaska are currently under consideration as potential agricultural lands.

16- Page IV-22 - The statement, "All perennial streams and those streams which carry water during peak runoff seasons are to have buffer strips," is not necessarily applicable in Alaska.

17- Page IV-36 - The above comment is also true of the statement, "To avoid adverse impacts to the greatest number of wildlife species, cutting, particularly clearcutting, is to be confined to small scattered tracts ranging from 15 to 40 acres in size so as to produce the greatest 'edge' effect in any general area."

18- Page VII-6, last sentence - If this is considered "somewhat far-fetched," perhaps it is better left unsaid. Although agricultural development is possible in several areas (see our comment on page III-91), soil losses from silvicultural activities should in general not exceed losses from agricultural activities.

19- Page VIII-1, second paragraph - The first sentence could be misleading and should be qualified. Within several years BLM lands in Alaska will be intermingled with private (largely Native) and publicly managed forests (State, d-2).

20- Page VIII-12, last sentence - We again question the validity of stating that Alaska forests will remain economically inaccessible for this long a time.

21- Page VIII-24, paragraph 2 - Same comment as page VIII-12, above.

22- Page VIII-39 - This is another statement which could be clarified. In discussing alternatives to the BLM supply of timber, the draft says: "A recent Forest Service study indicates that under assumed levels of management the increased production from the National Forests could immediately more than offset the total elimination of the 1.3 billion board feet produced annually from Bureau administered lands." Both the Forest Service and BLM must consider total national needs and it is unlikely that those needs would permit increased timber harvest from the National Forests while completely eliminating such harvests on BLM administered lands.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Forest Service, USDA
Washington, D.C. 20250

Paragraph #	Response
1	The text has been revised. Pertinent authorities relating to the management and protection of resources on Bureau lands appears in Chapter I(B), Forest Management Authorities, Objectives and Policies.
2	Generally, Chapter I is describing the proposed program and "justification" for use of a particular practice as suggested is, therefore, inappropriate for this format.
3	Impacts to threatened and endangered species of plants and animals are discussed in Chapter III(F) and (G). Methods or means of mitigating impacts are described in Chapter IV(F) and (G).
4	We believe the final environmental impact statement accurately identifies the type and magnitude of anticipated impacts.
5	One of the objectives of this environmental impact statement is to provide a basic foundation and framework for subsequent environmental impact statements and environmental analysis. These documents which will be prepared on a regional, local or project basis will provide a greater in-depth analysis of site-specific and cumulative impacts.
6	We agree that control of dusty roads and unstable slopes is technically feasible; however, we are attempting to point out in Chapter IV that even after applying all reasonable and practicable mitigating measures we can still anticipate some fugitive dust emissions and localized mass soil wasting.
7	Responses to specific comments pertaining to Alaska follow.

Forest Service, USDA
(Continued)

Paragraph #	Response
8	The text has been revised. A single tabulation (Table VIII-1) appears at the end of Chapter VIII.
9, 10, 11 12, and 13	The Bureau recognizes throughout the environmental impact statement that the current stewardship policy for management of lands in Alaska is primarily due to the Alaskan Statehood Act, the Alaskan Natives Claims Settlement Act and other factors. Until land selections adjudicated under these acts, Bureau management efforts will be restricted to custodial type efforts. This situation will persist throughout the decade. As the current uncertainties are resolved, however, the Bureau will take a more active and expanded role in land-use planning and development of the national resource lands in Alaska.
14	In certain cases the use of buffer or filter strips may not be effective in controlling adverse impacts to streams and rivers. Under most circumstances, however, buffer strips are beneficial in controlling sediment and logging debris in surface water. With respect to our statement "clear-cutting and seed tree cutting practices are not to be employed on fragile areas having shallow soil mantles, ... ", We emphasize that these are fragile areas.
15	The text has been revised to reflect this comment.
16	See response to paragraph 14.
17	Although confining clearcutting to small scattered patches ranging from 15 to 40 acres in size may not always be appropriate, we believe these parameters are generally applicable to interior Alaska. Selection of harvest practice and determination of unit size will be coordinated and integrated with other resource management programs including wildlife to achieve, to the extent possible, the goals of each program.

Forest Service, USDA
(Continued)

Paragraph #	Response
18 and 19	The text has been revised to reflect these comments.
20 and 21	In our opinion, the environmental impact statement accurately describes the current and near-term timber management opportunities on national resource lands in Alaska. Also, see our response to paragraphs 9-13 above.
22	Identification of this sub-alternative merely points out that other federal timber lands, specifically those of the Forest Service, are capable of offsetting a reduction of 1.3 billion board feet from Bureau-administered lands. This is done for comparative purposes and should not be construed as Bureau-endorsement of such an alternative. Further, we agree with your comment that the Bureau has an obligation to consider and be responsive to national objectives and goals.

EIS file

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Room 412 Mohawk Building
222 S.W. Morrison Street
Portland, Oregon 97204

May 20, 1975

IN REPLY REFER TO
10ED.3

Mr. Curt Berlund, Director
Bureau of Land Management
18th and C Street, Northwest
Washington, D. C. 20240

Dear Mr. Berlund:

Draft Environmental Impact Statement, DES 75-10
National Timber Management Program
Bureau of Land Management

We are sorry for the delay, but we had to circulate the subject document to three of our State offices for review. Following are the Federal Highway Region 10 major comments on the subject document.

1. Page III-10, third paragraph. "However, the impact on its currently limited use for human consumption will be minimal in a- terms of lowered water quality due to the production afforded by stream-sized buffer strips."

   b- To measure the impact of lowered water quality by its currently limited use for human consumption may be inappropriate.

   c- What happens to aquatic consumption as discussed on page III-75 and 76?

2. Page III-33, second paragraph. "Soil dumped in flow water in the a- course of repairing banks, piers, abutments and approach fills cause soil stream sedimentation."

   Is the reader of this EIS to assume that this is standard oper- b- ating procedure? If so, techniques should be explored to keep fine soil particles from entering the flow of a stream.

3. Page III-51 and 52, paragraph on transportation. What are the impacts of adjacent vegetation or aquatic habitats?

-more-

4. Page IV-9, first paragraph. "Cut slopes and ditch gradients are to a- be flattened in order to reduce a number of cuts thereby reducing erosion hazard."

   b- What is meant by this statement?

5. Page IV-8, second paragraph. We don't understand the portion of the a- sentence, "to minimize erosion due to excavation, the total length of road cut is to be minimized, but the vertical depth of each cut is to be maximized in most instances."

   The concept of fitting the country-side as close as possible to re- b- duce scar and erodible areas means minimizing both cuts and fills under given road standards.

   If, due to the lay of the land, there is a choice of obtaining excavation to make necessary fills from one location as opposed to many c- involving smaller cuts, then possibly one deep cut might be more practicable unless it is completely uneconomical haul-wise. Type of materials is also important. Basically, we feel the statement on page IV-8 could be clarified.

6. a Page IV-9, first paragraph. "Removal of the contour hump in a hill cut will decrease erosion potential and make maintenance easier."

   b- What is meant by this statement?

7. Page IV-11, last paragraph. Use of one material source minimizes erosion, but concentrate haul loads on one system of roads will increase maintenance requirements on those roads. This is minor, however, compared to the increased erosion from use of several small pits.

8. a Page IV-13. "Use of short right angle culverts are to be avoided."

   This statement and the next sentence apparently address special b- cases. A more general sentence regarding culvert placement with relation to natural drainage characteristics would be more appropriate.

9. Page IV-32, paragraph on transportation. This paragraph is ambiguous. Perhaps it is meant to say that roads will be fitted to the terrain to mitigate impacts.

10. Page IV-24, 25, and 26. These mitigation methods are very broad and vague.

-more-

11. Page VI-2, third paragraph. --"give a better understanding of a- geology of the area." --- questionable value as a positive impact.

    b- If these slopes are treated for erosion control and aesthetic purpose, will the rock be exposed adequately for geological study purposes?

12. In the summary of environmental impact of timber management, page III-7 "Recreation" makes no mention of sedimentation due to roads or road construction into recreational streams or lakes. Perhaps the following statement could be included. "Studies have shown that road construction associated with logging is a factor which causes surface erosion and mass soil movement resulting in degradation of water quality."

13. Page IV-16, first paragraph. We suggest "2½ to 1" rather than 2½; 1.

14. Page V-10. We suggest adding "or roads" after "logging areas" in the next to the last sentence on the page. Other sections of the EIS discuss recreation impacts from waters mudded by both logging areas and roads.

Sincerely yours,

Richard C. Cowdery

Richard C. Cowdery, Director
Office of Environment and Design

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Federal Highway Administration, U.S. Dept. of Transportation
Portland, Oregon 97204

Paragraph #	Response
1a and 1b	This phrase has been deleted from the text.
1c	We could not locate your reference to "aquatic consumption" in this section of Chapter III.
2a and 2b	Chapter III is describing unmitigated impacts. Residual adverse impacts are described in Chapter V.
3	The effects of road construction on adjacent vegetation and aquatic habitats have been discussed in Chapter III.
4, 5, 6, 7, 8, 9 and 10	Chapter IV has been revised to reflect these comments.
11a and 11b	Exposure of near-surface geology in road cuts may often provide soil scientists, geologists, foresters and other disciplinary experts with additional information which can be used in making land use decisions and management prescriptions. Though all road cuts will not be permanently exposed, those resistent to erosional forces and those which cannot be revegetated will remain exposed for "study" purposes. Exposed areas may also be "studied" prior to revegetation or other erosion control treatments.
12	Chapter III has been revised to reflect this comment.
13 and 14	The text has been revised to reflect these comments.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

MAY 15 1975

Director (340)
Department of the Interior
Bureau of Land Management
18th and C Streets, N.W.
Washington, D. C. 20240

Dear Sir:

We have reviewed the draft Environmental Impact Statement on the Bureau of Land Management's National Timber Management Program.

1- On the basis of our review, we note that the statement lacks data on the chemical nature of fire retardants. Such data is needed in order to evaluate the occurrence, nature, effect of decomposition, and degradation of products of retardants. This is also needed to determine the effects of accumulation of some of the inorganic constituents of such chemicals.

2- Further, we feel mention should be made to the fact that degradation of herbicides, insecticides, and fire retardants may be considerably slower in the cooler climate of Alaska than in other areas for which data are available.

Thank you for the opportunity to review the statement.

Sincerely,

Charles Custard
Charles Custard
Director
Office of Environmental Affairs

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Office of the Secretary
Department of Health, Education and Welfare
Washington, D.C. 20201

Paragraph #	Response
1	The exact chemical composition or formula for retardants is only available from the company who produces the retardant. We have included in the statement under "Fire Control" a description of the products used by the Bureau of Land Management (BLM). A committee composed of representatives from BLM, Forest Service, and Fish and Wildlife Service are studying the effects of chemical retardants on aquatic environments. This committee was formed in 1970, and work has been completed on bioassay tests. This year (1976) field studies will be completed on retardant movement in the environment. Guidelines have been issued to the field on the use of retardants in the environment. As future information from field studies becomes available, it will be released.
2	Chapter III, Impact on Water, notes that degradation of chemicals in the Alaskan climate may be considerably slower than that of other areas.

Advisory Council
On Historic Preservation
1522 K Street N.W., Suite 430
Washington D.C. 20005

APR 1 8 1975

Mr. Roman H. Koening
Assistant Director
Bureau of Land Management
U. S. Department of the Interior
Washington, D. C. 20240

Dear Mr. Koening:

1- This is in response to your request of March 20, 1975, for comments on the draft environmental statement for the proposed National Timber Management Program of the Bureau of Land Management (BLM). Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that this DES is inadequate regarding our area of expertise because it does not clearly demonstrate understanding of or a commitment of BLM to the requirements of Section 106 of the National Historic Preservation Act of 1966 or Executive Order 11593, "Protection and Enhancement of the Cultural Environment" of May 13, 1971, through the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800).

2- The statements made on page IV-53 with regard to actions to be followed to protect and/or mitigate the impact of timber management programs on archeological and historic resources indicates an awareness of historic preservation legislation and regulations. However, the draft environmental statement fails to point out that the forest manager is not permitted to exercise independent judgement, when a proposed undertaking will affect historic, architectural, archeological and cultural values, as to the appropriate measure to be followed in protecting or mitigating the undertaking's impact on the identified resource. Section 106 and Executive Order 11593 direct the forest manager to first afford the Council an opportunity to comment on the undertaking. The Council's Procedures detail the steps to be taken by the forest manager in determining an appropriate means of protecting or mitigating the impact of the undertaking on identified cultural resources.

Should you have any questions or require any additional assistance, please contact Brit Allan Storey of the Advisory Council staff at P. O.

Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

John D. McDermott
John D. McDermott
Director, Office of Review
and Compliance

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Advisory Council on Historic Preservation
Washington, D.C. 20005

Paragraph #	Response
1 and 2	Chapter IV(J)(3 and 4) has been expanded to reflect these comments. Specifically, these paragraphs now recognize the steps which must be taken to protect cultural resources.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 11 1975

OFFICE OF THE
ADMINISTRATOR

Mr. Curtis Berklund
Director
Bureau of Land Management
U.S. Department of the Interior
Washington, D.C. 20240

Dear Mr. Berklund:

The Environmental Protection Agency, in accordance with its responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act, has reviewed the Bureau of Land Management's draft environmental impact statement (EIS) for the proposed "10-year Timber Management Program." Because EPA is cognizant of the importance of the natural resource timber lands administered by BLM with respect to the long-term quality of the Nation's environment as well as the Nation's timber supply, we offer these comments in the context of assistance in ensuring multiple use/sustained yield and environmental protection for these timbered lands and their natural resources.

Our review of the EIS has brought forth two primary issues associated with the timber management program. The first issue relates to the intended scope of the EIS, and the second issue involves the method and assumptions underlying the setting of the allowable cut.

First, our view is that as a general discussion of timber
management environmental programs, the EIS constitutes a
generally adequate document. We believe, however, that
a programmatic EIS such as this does not obviate the
need to prepare EIS's on site-specific timber harvesting
1- decisions which could have a significant environmental
effect. We believe that site differences, even on such
a large scale as between the Northwestern U.S. and Alaska,
are too great to be adequately evaluated in a programmatic
fashion.

Second, in our view, the determination of the allowable
cut is the most important consideration of the proposed
2- management-environmental protection scheme. We believe that
the cut must be thoroughly analyzed, affording environmental
factors their proper and full consideration.

Other comments on the draft EIS relate to the document's
lack of secondary impact analysis, its need for a better
3- description of the BLM management system, and its need for
a better definition of the terms "short-term" and long-term".
These as well as our two major points are further addressed
in the enclosed detailed comments.

In accordance with our rating system, the proposal and the draft EIS have been assigned the rating of "LO-2" (Lack of Objections -- Insufficient Information) signifying our general lack of objections to the action, but that additional information pertaining to our detailed comments should be included in the final EIS.

Thank you for the opportunity to provide comments. Please contact Mr. Leo Leonhart, (202) 755-0770, of my staff if you have any questions concerning our comments.

Sincerely yours,

Sheldon Meyers
Sheldon Meyers
Director
Office of Federal Activities

Enclosure

Detailed Comments on the Bureau of
Land Management 10-Year Timber
Management Plan Draft Environmental
Impact Statement (EIS)

I. Scope of the EIS

In addressing a larger issue of BLM's land use planning
system as it relates to the proposed timber management plans,
EPA encourages that Management Framework Plans be completed
and updated on BLM forest lands as early as possible. We
4- believe that these plans, including the necessary compliance
with NEPA, would greatly assist in providing the needed
detail and level of analysis on specific units of land and
would thereby facilitate the proper planning and management
of timber resource and other multiple use values and assure
environmental protection.

Although we believe that BLM has shown a commendable
effort in assessing the environmental impacts associated with
Western U.S. timber management, we emphasize that additional
environmental analyses and, if necessary, environmental
impact statements should be prepared for site specific
development. As a starting point, we recommend that you
consider preparation of EIS's on the three (Northwestern
5- U.S., Alaska, and all other Western timber areas) timber
areas identified in the program EIS. We further recommend
that such EIS's incorporate a more thorough discussion of
BLM's planning decision-making system as it pertains to
timber management decisions and environmental considerations.

Further, we believe that secondary impacts associated
with the proposed BLM timber harvest program are not adequately
covered in this programmatic EIS. In order to provide
adequate analysis and consideration of such factors as the
effect of timber harvest on Oregon's tourist economy, air
6- quality impacts from timber processing, native American
impacts in Alaska, timber harvest on an inter-mixed land
ownership situation in the Rocky Mountains, etc., we
recommend that BLM consider specific EIS's on separate
land and impact units.

II. Determination of Allowable Cut

A critical aspect of this draft EIS which we believe
7- needs further discussion is the relationship of the allowable
cut calculations to the environmental impacts broadly covered

by this document. The size and location of the allowable cut is the most critical aspect of the timber planning process. Size and location can largely determine whether or not clear-cutting will be used, size of clear-cuts, number and mileage of roads, specific watersheds, etc. Once allowable cut is set for an area, then environmental management action becomes mainly an effort to mitigate impacts. Accordingly, we believe that a more complete discussion of this aspect should be included in this EIS.

Another concern involves the analysis of alternatives
contained in the EIS. The first two alternatives base their
8- difference on size of allowable cut and, hence, to the
potential impact. The third alternative proposed is based
on timber harvest technique differences.

We believe that a more realistic array of alternatives
would be based on the allowable cut and related geographic
differences. The mix of timber management techniques would
be a consideration under each alternative and not a separate
alternative itself. As is, the allowable cut figures are
largely taken as "given" values, and based on the programmatic
nature of the EIS, no adequate comparison of alternatives is
9- possible. The alternatives section of the EIS is critical
to the whole timber planning process. Without a full
consideration of the premises upon which the allowable cut
is determined, the decision basis becomes too narrow and
too restrictive. Why, for instance, must natural re-generation
of trees be relied upon under Alternative B (page VIII-13)?
Can't artificial re-stocking be part of any plan, regardless
of the size of the allowable cut?

As another example, the EIS (page VIII-40) states that
private industry lands would be incapable of providing
make-up timber if the allowable cut is decreased on BLM
lands. This implies that BLM timber must be cut because
10- of the lack of saw timber on private lands. The relationship
between the allowable cut determination and private timber
supply should be established.

III. Other Comments

(1) The EIS is correct in its identification of road building, road maintenance, and road use as probably the major environmental impacts associated with timber harvesting. EPA is especially concerned with road construction and use because of the very significant water quality impacts involved. We therefore believe that the following points should be addressed in the discussion of the road program:

a) A statement on page 2 of the EIS reads to the effect that road construction or protection may be viewed as necessary regardless of actual forest land use. In some cases this is
11- probably true, however, roads on timber lands are generally constructed to harvest timber with other uses being secondary. We believe that the road construction program and its relationship to timber management should be clearly shown in the EIS.

b) The role of timber roads in setting the land use direction of particular areas needs further discussion. Access (especially in Alaska and the Rocky Mountain areas) provided by roads has important relationships to vehicle use, possible
12- off-road vehicle use, demands for more vehicle access, wilderness values, and the setting of a certain degree of permanent management direction for non-BLM lands that are involved.

c) The problem of road maintenance in the long-term
13- needs better analysis. Long-term management of a road system is essential to environmental protection.

(2) EPA fully recognizes that numerous variables and future developments will necessitate changes in BLM timber
14- planning. We believe that several statements in this EIS need further explanation in terms of how future changes will be accommodated.

Specifically, the EIS states (page I-24) that the allowable cut will be re-computed every 10 years, but that policy or procedural or land use changes may require the recomputation of the cut. The point here is that these policy or procedural or land use changes may affect timber management plans, but
15- if these plans are environmentally sound and based on the carrying capacity of the specific land units involved, then the policy, procedural, or land use changes should not cause these environmental and carrying capacity limits to be abridged.

Also, the statement is made (page I-15) that in cases of irreconcilable conflicts over land use decisions, the land should be classified for a single use or combination of uses
16- in consideration of national, State or local priorities. Again, the land use decision made on such situations should be made in the context of carrying capacities and environmental protection.

(3) In numerous places in the EIS it is stated that certain actions will have "short-term" or "minor" impacts (p. 111-7 -- "occasional reduction in water quality"; p. 111-10 -- "will accelerate to a minor degree the natural rate"; p. 111-11 - "impact will be of relatively short duration", etc.). We point out that the assumption that impacts will be "minor" "short-lived", or "occasional" depends to a large degree on the pre-planning, administration, and follow-up of timber activities on an adequate basis
17- (while this point is, to an extent, noted in the EIS on p. IV-1, we believe it deserves additional emphasis). Also, the use of such terms presupposes that the initial decision is correct and a "no-go" decision will be made if the impacts are believed to be potentially greater than "minor". Also, the interpretation of these terms is highly discretionary. "Minor" sedimentation, as a example, may be "minor" on a large river, but "major" in terms of the water quality standards of a high mountain stream. This area needs further clarification.

(4) Associated with timber management activities involving use of chemical fertilizers, pesticides, etc., are many unanswered questions related to environmental impacts. An important policy decision that should be given more
18- discussion in the EIS is how BLM intends to handle these unknowns and their potential impacts in the context of management decisions. Such aspects as the extent of impact knowledge required before a particular chemical, etc., can be used should be discussed.

Since there is proof (page III-41) that fire retardants have severe adverse impacts on juvenile salmonids, and the possibility exists that there may be significant adverse
19- impacts from the retardant chemicals on the quality of water for domestic use, watering of livestock and terrestrial wildlife, we believe that the program should set forth a means of insuring their proper use.

Discriminatory use of chemicals is important at all times, particularly to insure against their introduction into waterways and against their adverse effect upon the health or welfare of humans, wildlife, and livestock.
20- Chemicals should not be used during periods that are critical to reproduction and growth. Also, grazing livestock on land that has been treated with insecticides, fungicides, or herbicides is not advisable.

As another example, on (page V-4) it is stated that "Accidental spills of chemicals, oils, etc. will occur...." "Will" implies fact and expected carelessness. Substitution
21- of "may" or "could" for "will" would change the context to infer only accidental occurrence. Many State forestry programs are not specifying the use of absorbent mats.

According to the EIS, use of pesticides on BLM lands will be extensive. Pesticide application will generally be by aerial application. This procedure, along with the aquatic weed control program, has the potential to
22- seriously contaminate streams and lakes in the vicinity of the application area. Of particular concern is the handling of 2,4-D. The EIS should also examine possible synergistic effects that could occur during the application of more than one pesticide.

(5) The monitoring of timber management activities as related to environmental impacts is a critical issue that
23- deserves full discussion in this EIS. As a minimum, type, frequency, follow-up, parameters, etc., should be covered for the various media monitored.

Most importantly, contingency plans and provisions related to the possible abridgement of environmental standards should be included in the EIS. Monitoring, in this respect,
24- must be looked upon as the key to signalling not only the extent and progress of problems, but also the need for appropriate corrective action.

(6) The EIS correctly identifies the need for coordination of BLM plans with those of other involved agencies and individuals to the extent feasible. Federal environmental and sustained yield principles obviously take precedence in management decisions on BLM administered lands, but State land use policy, for example, should also be considered
25- if it will be affected by BLM activities. Specific environmental planning programs as found in the Federal Water Pollution Control Act (basin plans, area-wide plans, etc.), the Clean Air Act (prevention of significant deterioration, etc.), and other legislative programs need to be considered in BLM timber activities.

(7) While the EIS acknowledges (page II-112) the
26- existence and significance of historic areas on BLM timber lands, the number of the sites and their locations on BLM lands remains unknown and unidentified. We suggest that the location of historic sites be determined during the preparation of environmental assessments and environmental impact statements on specific management plans so that full cognizance can be taken of these sites. In this way, EA's/EIS's on timber sale contracts can assess provisions for protecting these sites in accordance with the National Historic Preservation Act.

(8) The cost of carrying out the timber management program is given as $20 million per year. Page VIII-5 implies that the timber sales program will assume, in most cases, the road construction program. From reading the contract example, we were left with the impression
27- that the timber contractor or purchaser must bear the expenses for necessary road construction/maintenance. Yet, Page VI-7 states that State and local highway departments will feel long-term effects by way of diverting monies to increased road maintenance and related cost.

The EIS contains only a very general discussion of the economic aspects of the timber management program. There were no figures given as to a determination of the yearly value
28- of the timber contracts, the average annual revenues to the U.S., etc. This information would make the discussion more meaningful, and we suggest that it be included in the final statement.

(9) The presence of at least three known endangered species of fish (Page VII-4 and 5) within the BLM administered
29- forest lands should prompt special caution in lumbering activities near streams where these species occur to prevent any disruption to them or their habitats.

(10) On page IV-2, in paragraph 2, the Federal Environmental Pesticide Control Act, the Endangered Species
30- Act of 1973, the Noise Control Act, and the Solid Waste Disposal Act should be added as other Acts whose requirements should be met.

(11) Since the Report of the Federal Sub-Committee on Public Lands on Clearcutting on Federal Timberlands (page
31- VI-4) was not included, we suggest that at least a summary of this document be added.

(12) On page V-3, under Adverse Impacts that Cannot be
Avoided, it is stated that large areas of mass waste, (i.e.
mass movement of soil and geologic material) will take place
when cutting practices and logging methods are carried out
32-on moist steep slopes. However, the section on mitigating
effects (page IV-7) leaves one with the impression that this
type of situation would not occur, and that no cutting
would take place in the timber management program on steep,
moist slopes.

(13) A glossary of terms used would greatly enhance
the readability of the EIS. "Pingos", "gabions", "sidecast",
33-"plugs", "calderas", "sustained yield", "critical need
seasons", "broadcast burning", "jammer", "high-lead yarding"
are a few examples of such terms.

(14) The EPA publication, Process, Procedures, and Methods
to Control Pollution Resulting from Silviculture Activities,
34-EPA 430/9-73-010, October 1973, should be consulted and
referenced in this and subsequent EIS's. The publication
contains worthwhile information on pollution control in
timber management practices (copy enclosed).

(15) Based on the severe adverse impacts identified
on page II-42, we do not believe that the use of fire in
the Taiga as a timber management activity is advisable.
35-We believe that the irreparable damage to the permafrost
layer from the tractor-built fire lanes may be even more
disastrous than the fire itself.

The EIS did not detail when or under what conditions
fire will be used in the timber management program. While
we are aware that an EIS on fire management activities is
forthcoming, an appropriate discussion of the use of fire
should be included at least generally, in the current
EIS to provide a better understanding of this activity. The
36-adverse impacts listed on pages III-33 and-34, including
increasing stream temperature, increased sediment yields,
reduced soil surface infiltration rates, increased chemical
oxygen demand concentration in streams, increased potassium
concentrations, increased suspended sediments, etc., tend
to dictate the discriminatory use of fire. The EIS makes
little differentiation between the use and impact of prescribed burning, area burning, and wildfires.

(16) On Page I-37, we suggest that the discussion of
the practice of poisoning trees in the thinning process as
compated to mechanical means of removal be expanded. The
37- dangers to wildlife and possibly water contamination should
be carefully weighed. Does a poisoned tree become a snag
and still require mechanical removal?

(17) More consideration should be given to the practice
of mulching with shredded or chipped brush/slash or unmarketable timber on exposed erodable soil. This mulch could be
38- used as a cover to protect seeds as well as a control for
herbaceous weedy vegetation. This use of mulch could forego
the adverse impacts associated with burning and erodable
soil.

(18) Clearcutting is discussed on page I-26. According
to the statement, clearcutting units should not exceed 40
acres in normal circumstances. Exception to the 40-acre
39- rule are listed; however, it is not clear what constitutes
"other actions which would result in greater adverse environmental impact on the total forest." This point should be
clarified in the final statement.

(19) Defoliants are discussed for use on stands of
hardwoods (III-63). We are aware that recent studies have
shown that the removal of hardwoods and their replacement
40- with conifers has resulted in decrease in stream flows.
This fact should be noted in the statement's discussion of
water on page III-10.

(20) The primary and secondary adverse effects of
baiting are briefly discussed in the statement. More
specific information on the effects of this technique should
41--be included. For instance, information on non-target species
affected and measures to mitigate secondary losses should
be discussed.

(21) The effects of noise and man's intrusion during
timber harvesting on nearby wildlife should be discussed in
42- more detail. Special emphasis should be placed on possible
adverse effects to reproduction, nesting, and general
behavioral characteristics.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

United States Environmental Protection Agency
Washington, D.C. 20460

Paragraph #	Response
1	As indicated in Chapter I, the Bureau of Land Management has determined that separate environmental impact statements (EIS's) will be prepared covering each of the sustained-yield units in western Oregon. These EIS's will encompass over 50% of the Bureau lands in the timber production base (excludes Alaska) and 92% of the volume harvested annually. The Bureau will also prepare environmental impact statements for the timber management programs in Coeur d'Alene District, Idaho and Ukiah District, California. Additionally, the Bureau will maintain its policy of preparing site-specific environmental analysis records for individual timber sales, reforestation projects, thinning contracts, or other actions which could significantly affect the human environment. Where determined necessary, site-specific environmental impact statements may also be required for these types of actions.
2	The allowable cut determination is one of the final stages of the Bureau Planning System as indicated in Figure I-3a. Rigorous evaluation of possible cutting levels is made at the Management Framework Plan stage. These trial cut determinations include the concept of various levels of environmental protection.
3	Bureau responses to specific areas of questions cited in this comment are addressed in the following responses on an item-by-item basis.
Part I 4, 5, and 6	Intensive timber-oriented inventories are in the final stages of competition for BLM lands outside western Oregon. BLM lands in western Oregon will be reinventoried beginning in fiscal year 1976. The resource information gained through these inventories will be used in the Bureau Planning System to prepare and/or update Management Framework Plans. As indicated above, the Bureau will be preparing separate EIS's covering each of the sustained-yield units in western Oregon.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
Part II 7	As stated, the determination of the allowable cut is a vital step in developing a timber management program; and for that reason, the policies followed in its determination are set forth in Chapter I(D). The level of the cut does not in any way dictate whether or not clearcutting will be used nor does it determine the size of area to be clearcut. These elements are primarily a function of an area's capability to be reforested which is accounted for in the prescribed system of cutting and the policies relating to the size of the cutting area, respectively. In the former case, they are considered in the calculation of the allowable cut. The level of the cut, therefore, reflects the system of cutting to be employed. The latter is carried out in the course of laying out a timber sale. To varying degrees, mitigative measures are "built" into the determination of the allowable cut. For example, in those situations where a decision is made not to harvest timber along a river in order to protect aquatic wildlife, the acreage in the buffer strip is excluded from the allowable cut. Following these kinds of decisions, the allowable cut is determined and subsequently implemented on those lands available for timber production consistent with specific on-the-ground mitigative measures described in Chapter IV.
8 and 9	The first three alternatives are based on program intensities. The levels of the allowable cut are a function of these intensities and not the converse as stated in the comment. The emphasis is describing these and the fourth alternative is on how they differ among themselves and from the proposed program in terms of environmental impacts rather than in terms of allowable cut differences. Naturally, the level of the cut has some bearing on the nature and magnitude of the impacts, and these are indicated where appropriate.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
Part II 8 and 9 (cont.)	There is an infinite number of alternatives that could be addressed. As pointed out in the comment, an alternative similar to Alternative B emphasizing artificial regeneration could be included. There are countless other possible combinations or program gradations. The alternatives cited (which include an expanded timber management program alternative) are intended to represent the basic alternatives under which forest lands could be managed. Further, they depict the general environmental impacts that could be expected whether they are applied nationwide or on a relatively localized area.
10	The language in the EIS was not intended to imply that BLM timber must be cut because of the lack of sawtimber on private lands. The point intended is that any reduction in BLM timber production could not be expected to be offset by a corresponding increase from the industrial sector. The determination of the allowable cut level is made only for BLM lands and is entirely independent of the private timber supply situation except as reflected by national supply and demand. It has been advocated by some parties that the allowable cut determination should explicitly address itself to the private supply situation to the extent of combining the federal and private properties to form a sustained-yield unit for which a cut would be calculated. To date, the BLM has not done so nor do current plans call for this kind of action.
Part III 11	Throughout the text, the Bureau has pointed out the relationships between the road construction program and timber management. In our opinion, Chapters I, III, and IV specifically and accurately describe this relationship.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
12	Chapter III has been revised to reflect this comment.
13	Chapter IV(C) (under Transportation) provides an exhaustive discussion of mitigative measures which will be employed to reduce impacts of transportation systems. Several paragraphs of this discussion (which are devoted to road maintenance), we believe adequately and accurately discusses both short and long-term environmental protective measures.
14, 15 and 16	The appropriate sections of Chapter I have been expanded to include these comments.
17	The statement specifies that the effectiveness of mitigative measures will be dependent upon, among others, the activities identified in your comment. Added emphasis has been afforded by underlining the appropriate phrase in the text. Further, the use of terms such as "minor," "short-lived," or "occasional" does not imply that a "no-go decision will be made if the impacts are greater than minor." The environmental impact statement is not a decisionmaking document, but rather one of many tools or sources of information which are used by the responsible official in reaching a decision. Chapter III has been expanded to indicate that the impacts discussed in the EIS are on a program basis and that local, regional or site-specific impacts may vary considerably.
18	As indicated in Chapter IV(D), the use of pesticides in the Bureau's timber management program will be guided by existing laws and the rules, regulations, and policies established by the Environmental Protection Agency and U.S. Department of the Interior. Further, for each pesticide project, the Bureau will prepare an environmental analysis and, as determined necessary, an environmental impact statement. These documents will fully explore the potential consequences of a proposed project and will provide an exhaustive search and discussion of alternatives. As indicated in the statement, the Bureau will avoid the use of chemical pesticides when nonchemical techniques offer a practical and reasonable alternative option.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
19	Fire retardants approved by BLM are ammonium compounds. All use of fire retardants is based on preventing damage to the environment, particularly contamination of streams. A report, "The Use of Chemical Fire Retardants Near Aquatic Environments," prepared by the National Marines Fisheries Service under a research contract with BLM provides data relating to the toxicity of retardants to fish life. This report has subsequently resulted in the publishing of guidelines for the use of retardants in the environment. These guidelines provide assurance that all resource values of an area will receive appropriate protection from retardants.
20	We agree. These precautionary measures are recognized in Chapter IV of the final environmental impact statement.
21	The text has been revised to reflect this comment.
22	The potential impacts of pesticide use are recognized in the final environmental impact statement. Though only brief reference is made to possible synergistic effects, we believe such an occurrence would be infrequent (remote) and would depend upon the chemicals and the environment involved. Therefore, because of the anticipated infrequency and the infinite number of chemical-environmental combinations which could be involved, it is our opinion that further discussion should be reserved for environmental analysis prepared on specific projects.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
23 and 24	Type, frequency, follow-up, and parameters of monitoring will vary considerably depending upon the level of activity, type of activity, extent of project, time of year, and a variety of other conditions. On certain projects, for example, monitoring of activities is continuous during the life of the project and may continue indefinitely following project completion, i.e., in the case of certain pesticide applications. In other circumstances such as timber sale contract administration, an inactive project area may only need visitation biweekly while other active projects require more frequent checks, i.e., twice weekly. As indicated in Chapter I(E), however, timber sale contracts are usually checked at least once each week to insure compliance with the terms and conditions of the contract. Because of the varied and infinite nature of monitoring requirements; specific types, frequencies, and parameters must be established on a project basis and are, therefore, discussed only briefly and generally in the final EIS. Abridgment of environmental standards may result in temporary suspension of timber management activities until conditions permit continuation of the project. Since this comment did not specify that environmental standards might be abridged, we are unable to discuss "contingency plans" for a specific situation. Generally, the mitigative measures discussed in the EIS, i.e., mulching exposed areas, seeding, planting, and hauling. etc. could also be used to mitigate impacts caused by unforeseen events.
25	Coordination with local, state and other federal agencies land-use plans is an integral part of the Bureau Planning System.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
26	Chapter IV(J)(3 and 4) has been revised to insure protection of archeological and cultural resources.
27	In reference to your comments, Chapter VIII is referring to the cost of constructing and maintaining roads constructed by the purchaser to gain access to Bureau timber. This is carried out during the period of timber sale contract. Chapter VI is relating to the impact to state and county maintained roads caused by log hauling.
28	Chapter II(K)(1 and 2) has been expanded to include this information.
29	Threatened and endangered flora and fauna receive special attention throughout the Bureau Planning Process and in the preparation of site-specific environmental analysis for individual timber management activities. As determined necessary, special precautionary measures are translated to site-specific situations to insure protection for threatened and endangered species and their respective habitat.
30	The text has been revised. Those acts cited in your comment and those cited in Chapter II have been consolidated with various other acts in Chapter I(B).
31	The subcommittee's recommended policy guidelines are included as Appendix D in the final environmental impact statement.
32	Chapter V(B) indicates that, at least, some mass movement of soil and geologic material will occur as a result of timber management operations on moist slopes. We could find no reference to your comment, "that large areas of mass waste will take place . . ." Further, we must realistically assume that, despite the application of the mitigative measures described in Chapter IV, small, localized, mass wasting will occur even in "safe" areas as soils, soil moisture, and geology may often vary considerably even within small cutting units.

United States Environmental Protection Agency
(Continued)

Paragraph #	Response
33	A glossary of terms has been included in the final environmental impact statement.
34	Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Practices was consulted in preparing the draft statement. This document has also been consulted and referenced, as appropriate, in preparing the final environmental impact statement.
35	The use of fire as a management tool will be based on an evaluation of the resources through research, planning, and field projects, applying the best available knowledge.
36	It is not the intent of the EIS to specify when and under what conditions fire will be used as a management tool. This information will be developed in detail on a more specific area. The use of prescribed fire, however, will be in a defined area under certain conditions which will be a part of the prescription. Area burning is a type of prescribed burning. The only difference is the intensity of the burn; and, in this respect, wildfires can be more intense when the conditions of fuel and weather are suitable for large fires. The use of fire will be found in Chapter III.
37	Chapter I(E)(1)(s) has been expanded to specify the method used for chemical thinning. Poisoned trees die and are left standing. There is no need to mechanically remove the tree.

Unites States Environmental Protection Agency
(Continued)

Paragraph #	Response
38	The BLM and the U.S. Forest Service recently conducted a study, New Alternatives for Residue Management on BLM Lands. Chipping and mulching wa. one of the alternatives explored in this research project. Reforestation specialists, however, pointed out that mulching often interferes with planting, raises surface temperatures, inhibits infiltration of light and rainfall, and causes nitrogen deficiency. Additionally, chips (mulch) compete for space and moisture if mixed with soil in the planting hole and, thus, may prevent successful germination and growth of seedlings. Used judiciously, however, chipping and mulching have practical applications in timber management activities.
39	This statement has been deleted from Chapter I(D).
40	Chapter III has been expended to include this comment.
41	Adverse impacts of baiting are discussed in Chapter III. Mitigative Measures, Chapter IV(G)(1) has been expanded to indicate the methods used to avoid poisoning of non-target species.
42	This section of Chapter IV has been revised to reflect your comments.

STATE OF ALASKA

JAY S. HAMMOND, GOVERNOR

OFFICE OF THE GOVERNOR

STATE POLICY DEVELOPMENT AND PLANNING

POUCH AD – JUNEAU 99811
PHONE 465-3512

June 9, 1975

Director (220)
Bureau of Land Management
18th and C Streets, N.W.
Washington, D.C. 20240

Subject: BLM Timber Management DEIS
State I.D. No. 75040201

Dear Sir:

The Alaska State Clearinghouse has completed review on the subject project.

The following agencies were invited to review and comment:

State of Alaska

- Department of Community & Regional Affairs
- Department of Economic Development
- Department of Environmental Conservation
- Department of Fish & Game - Anchorage - Fairbanks
- Department of Highways
- Department of Law
- Department of Natural Resources
- Division of Lands
- Department of Public Works

Three of the above agencies responded:

The Department of Economic Development stated:

1- This EIS suffers from some of the same shortcomings as the recent draft EIS for the proposed Tongass National Forest Land Use Plan. It is so broad a document that one is not able to ascertain the particular consequences of land management decisions at specific locations.

2- BLM administered timber resources in Alaska are dispensed with by the judgement that due to "economic enaccessibility," the timber management program is "essentially limited to fire protection". Since this is a 10-year management plan, at least some of the timber stands will become economically accessible.

3- The statement remarks (Page I-9) that "timber sales" on BLM lands in Alaska "have steadily decreased from 3.8 million board feet in 1964 to zero in 1974". This is not an indication of decreased demand, but is rather an indication of reduced sale offerings by the BLM in Alaska. Much of this connection with ANCSA.

4- As long as the BLM is prepared to issue individual draft EIS for all major timber management activities in Alaska, the interests of Alaskans stand a better chance of being protected. If this document is to be the sole advance public notice for activities planned furing the next 10 years, then we must reject it as an inadequate statement.

The Department of Fish & Game stated:

5- Hurried review of the subject statement did not disclose any items of conflict. We wish to remind the Bureau of Land Management that we wish the opportunity to review and comment regarding all proposed timber sales, grazing leases, timber fire protection management schemes, etc. as provided for in the letter of understanding between the Alaska Department of Fish and Game and the Bureau of Land Management.

The Department of Highways stated:

In our area of expertise, it is difficult to comment on this document.

6- It appears that the writers are inexperienced in the construction business and treat the subject of road construction too generally.

In the Final Environmental Impact Statement, a chapter should be devoted to logging and access road construction, with standards and regulations governing construction methods specifically spelled out.

The document has the appearance of being hastily thrown together from various sources with a multitude of contributing authors.

The following are items which were questioned during our review:

7- Chapter I, page 58. The description of slacklines is poor.

8- Chapter II, page 106. The page is duplicated by the following page. The duplicate is partially expanded.

9- Chapter III, page 10 states, "...with few exceptions, water quality in terms of temperature and oxygen content will remain at non-lethal levels." This literature should be cited.

10- Chapter III, page 15 states that recreation (fishing) will have an adverse impact of minor magnitude due to timber management. Earlier it was stated that the aquatic habitat will be adversely impacted due to sedimentation and slides, principally from road construction. (Ch. III, pg. 12). Later, it was stated that "The accessibility provided by roads to fishermen represents the most signification impact on wildlife populations." (Ch. III, pg. 2) The only thing listed that will be of minimal harm seems to be logging.

By using the above criteria, we have:

		Magnitude
First Stage	Road Development Impact "Adverse"	
Second State	Logging Impact Minor	
Third Stage	Recreation (Fishing) "Most Significant Impact"	*Major

* The area will remain accessible, therefore; the impact will remain the same and the magnitude must be major.

11- Chapter III, page 18-19. Two experiments are referred to, New Hampshire and Oregon. This literature should be cited.

12- Chapter III, page 93. The second sentence under Visual Impacts is unreadable.

13- Chapter IV, page 35. How can you insure that only porcupines will be poisoned by strychnined slat blocks? How can you possible locate the animals that have been poisoned so you can burn them?

14- It is beyond comprehension that the Bureau of Land Management will not allow the use of Amitrol, a comparatively harmless herbicide, on their lands, yet propose a strychnine program for the control of porcupine. It is a well known fact that strychnine is a highly dangerous, highly residual poison whose use has been discontinued primarily for those reasons.

Due to the incompleteness of this document, it is our recommendation that it be considered as a Preliminary Draft. The subject matter and scope of the program are too complex to be handled in general unspecific terms.

We would appreciate another opportunity to comment on the Bureau of Land Management's Timber Management Plan when it appears in a more concise format.

We hope these comments will be of assistance to you in the development of a final environmental impact statement.

Sincerely,

Raymond W. Estess

Raymond W. Estess
State-Federal Coordinator

cc: Salvatore DeLeonardis

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Office of the Governor, State Policy Development and Planning
State of Alaska
Juneau, Alaska 99811

Paragraph #	Response
1	The Timber Management environmental impact statement is designed to identify and evaluate impacts on a programwide basis. An indepth, comprehensive assessment of site-specific impacts will be discussed in the environmental impact statements prepared for the individual sustained-yield timber management programs in western Oregon and in the site-specific environmental analysis prepared for each timber management action.
2 and 3	Based on current projections, it is our opinion that economic accessibility of BLM timber resources in Alaska will not be feasible during the current 10-year program. Development of the Bureau's timbered lands in Alaska is also impacted by the uncertainty of land tenure caused by the Alaska Statehood Act and the Alaskan Native Claims Settlement Act. You have aptly pointed this out in your comments.
4	This document does not constitute the sole advance public notice for activities in Alaska. Interested agencies, individuals, and organizations will have the opportunity to provide input into the Bureaus land use planning program described in Chapter I(C). They will also be given the opportunity to comment on subsequent environmental analysis and impact statements prepared for proposed BLM timber management actions in Alaska.
5	The memorandum of understanding between the Alaska Department of Fish and Game and the Bureau of Land Management has served well the purpose of coordination of operations between the two agencies. We intend to strengthen the coordination by adding Sikes Act activities to the memorandum.

Office of the Governor, State Policy Development and Planning
State of Alaska
(Continued)

Paragraph #	Response
6	Even though there is not a specific chapter dealing with construction methods, the environmental impact statement identifies the potential impacts of these activities on the environment and indicates the possible mitigative measures that must be taken. Based on this information, the road designer can incorporate the mitigative measures into the design with suitable standards and specifications.
7	The description of slacklines has been expanded to reflect your comment.
8	The text has been corrected.
9	Chapter III has been revised to reflect this comment.
10	The references you cite indicate the type of impact (adverse or beneficial) that can be expected on a particular component of the environment. The impact summary (now Table VIII-1) expresses the cumulative impact (both type and magnitude) on general categories of environmental components. In our opinion, this table accurately reflects the cumulative impacts of the proposed timber management program. The table, however, does point out the probability of impact variation (type and magnitude) depending upon the type of management practice applied and the specific environmental component involved.
11	Literature citations are included in the revised text.
12	The text has been corrected.

Office of the Governor, State Policy Development and Planning
State of Alaska
(Continued)

Paragraph #	Response
13	Strychnine salt blocks encased in special metal containers are placed in trees at least 10 feet above the ground. Thus far, this method has been effective in porcupine control with little, if any, nontarget species lost. The procedure has been approved by the Federal Working Group on Pest Management, and the operations are supervised by the U.S. Fish and Wildlife Service technicians. The sentence on collection of poisoned animals has been removed from the statement. There is no significant loss due to secondary poisoning of animals.
14	Strychnine is used on a limited basis and in small quantities to protect young trees from gopher or porcupine damage. Its placement is highly selective and controlled so as to cause little risk to humans, large animals, birds, and water quality. The U.S. Department of the Interior has not prohibited the Bureau from using this chemical. Amitrol, on the other hand, has been prohibited by the Department of the Interior and, therefore, cannot be used by the BLM or other Interior agencies. Amitrol is also highly damaging to conifers and would have limited utility in the Bureau's forest development programs.

ARIZONA DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION
206 South Seventeenth Avenue Phoenix, Arizona 85007

RAUL H. CASTRO
Governor

WILLIAM A. ORDWAY
Director

WILLIAM N. PRICE
State Engineer

April 23, 1975

Mrs. Constance LaMonica
Arizona State Clearinghouse
Office of Economic Planning
and Development
1624 West Adams Street
Room 317
Phoenix, AZ 85007

Re: Timber Management - INT DES 75-10
Draft Environmental Statement
Bureau of Land Management
State Identifier: 75-80-0010

Dear Mrs. LaMonica:

The Environmental Planning Services of the Highways Division, Arizona Department of Transportation, has reviewed Timber Management - INT DES 75-10 Draft Environmental Statement submitted by the Bureau of Land Management of the U.S. Department of the Interior.

We note that even though the forest management project covers 3.5 million acres of timber land, only about 7,800 acres are located in Arizona, primarily in Mohave County.

The project, as outlined, should cause no adverse impact or conflict with Arizona State highway interests. The plan to insure a vigorous forest should not only provide a continuous supply of forestry products but also good wildlife habitat and beauty for the motorists using the highways and the forest roads in the project area.

The overall plan for the improvement in the BLM forest land reflects a very comprehensive proposal and noteworthy appreciation for the environment in timber production, construction of forest roads, timber harvesting and related activities.

We appreciate the opportunity to review and comment on this proposal.

Yours very truly,

WM. N. PRICE
State Engineer

Mason J. Toles

MASON J. TOLES, Manager
Environmental Planning Services

MJT/ADG/cm
cc: Bureau of Land Management

HIGHWAYS · AERONAUTICS · MOTOR VEHICLE · PUBLIC TRANSIT · ADMINISTRATIVE SERVICES · TRANSPORTATION PLANNING

Governor
~~XXXXXXXXXX~~
Raul H. Castro
Commissioners:
MILTON G. EVANS, Chairman, Flagstaff
ROBERT J. SPILLMAN, Phoenix
WILLIAM H. BEERS, Prescott
CHARLES F. ROBERTS, O.D., Bisbee
FRANK FERGUSON, JR., Yuma

Director
ROBERT A. JANTZEN
Asst. Director, Operations
PHIL M. COSPER
Asst. Director, Services
ROGER J. GRUENEWALD

ARIZONA GAME & FISH DEPARTMENT
2222 West Greenway Road Phoenix, Arizona 85023 942-3000

May 1, 1975

ARIZONA STATE OFFICE
BUREAU OF LAND MANAGEMENT
MAY 2 '75
SD
ASSOC. SD
PCS
RESOURCES
TECH SER
MGMT SER
PUB AFF
CF
ACTION

Mr. E. F. Spang, Acting Director
Bureau of Land Management
3022 Federal Building
Phoenix, AZ 85025

Dear Mr. Spang:

The Draft Environmental Statement pertaining to Timber Management on Bureau of Land Management forest lands dated January, 1975 has been reviewed by our Department. While very little BLM forest land is to be found in Arizona in comparison to other western states, we nonetheless wish to point out some important aspects concerning this land.

1- Most of the Arizona BLM timber lands in question harbor relic conifer communities. Mount Trumbull, the Virgin Mountains (Mt. Bangs), and the Shivwitts Plateau (Mt. Dellenbaugh) in the Arizona Strip District have been logged previously. Mt. Trumbull is a Kaibab squirrel transplant area. Turkeys have been transplanted on Mt. Trumbull and Mt. Dellenbaugh and are hunted in the Trumbull area. All three of these areas on the strip support excellent populations of deer. Graded roads, which are normally associated with a timber cut, would not justify from our standpoint the small timber acreage that would be gleaned from the relatively undisturbed strip country.

2- The Hualapai Mountains and the Cerbat Mountains (Mt. Tipton) in the Kingman District both present situations similar to those on the strip. It would be a shame to harvest and disrupt such marginal timber country.

3- Those BLM timber lands in southeastern Arizona also constitute marginal timber acreage. Relic pine stringers plus conifer communities on sky islands should be left alone. The damage that would be done getting the timber out would surpass the damage done by removing the timber. It might be pointed out that the Coronado National Forest has very few timber sales. A commerical charcoal industry should not justify any form of timber removal either.

We appreciate the opportunity to review this DES. Please contact us if further comments are desired.

Sincerely,

Robert A. Jantzen, Director

Bruce R. Duke

By: Bruce R. Duke, Specialist
Planning and Evaluation Branch

BRD/ab

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Arizona Game and Fish Department
Phoenix, Arizona 85007

Paragraph #	Response
1, 2, and 3	Wildlife values such as those described in your comments will be identified and evaluated along with other resource values and uses in the Bureau Planning System described in Chapter I(C). Public input, including that of other federal and state agencies, is an integral part of the planning process and will be used in the formulation of Management Framework Plans (land-use plans) for these areas.

TO:

Dr. James L. Schamadan, Dir.
Department of Health Services
1740 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
March 26, 1975
State AZ Number 75-80-0010

Economic Sec.
Civil Rights
Indian Affairs
Game & Fish
Az. State Museum
Mineral Resources
Bureau of Mines
Az Mining Ass'n
Arid Lands Studies
Environmental Studies
SW Minerals Exploration

Highway
Ag & Hort
Power
Health
Land
Parks
AORCC
OEPAD

Water

Region IV

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

☐ No comment on this project
☐ Proposal is supported as written
☒ Comments as indicated below

Comments: (Use additional sheets if necessary)

1- The proposal is supported with the understanding that an amendment will be made to the statement on page III-34 pertaining to nitrate concentrations (line 4).

2- This now reads that nitrate concentrations "will be far less than the limit of 10 parts per million recommended for domestic use, and well below any level deemed harmful to aquatic life". The reason for asking for a modification is that proposed standards promulgated by the U.S. Environmental Protection Agency in the Federal Register of October 15, 1974 limit nitrates to 4 or 5 mg/l depending on the type of watershed.

Reviewer's Signature James D. Goff P.E.
JAMES D. GOFF, P.E., ASSISTANT DIRECTOR

Title DIVISION OF ENVIRONMENTAL HEALTH SERVICES

Date 3-28-75

Telephone

TO:

Mr. John P. Dickinson
Dept. of Economic Security
1717 West Jefferson Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
March 26, 1975
State AZ Number 75-80-0010

Economic Sec.
Civil Rights
Indian Affairs
Game & Fish
Az. State Museum
Mineral Resources
Bureau of Mines
Az Mining Ass'n
Arid Lands Studies
Environmental Studies
SW Minerals Exploration

Highway
Ag & Hort
Power
Health
Land
Parks
AORCC
OEPAD

Water

Region IV

From: Constance LaMonica

This project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

Please return this form to the clearinghouse no later than 15 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

☐ No comment on this project
☐ Proposal is supported as written
☒ Comments as indicated below

Comments: (Use additional sheets if necessary)

The project is supported, provided that no action is taken which would affect lands held in trust for any federally recognized Indian tribes or the undetermined or unresolved land claims and water rights vested in these tribes without the express official approval of the respective Indian tribal government.

Reviewer's Signature

Title Indian Specialist

Date 4/9/75

Telephone 271-5881

RECEIVED
B.L.M. LAND OFFICE
MAY - 1 1975
10:00 A.M.
PHOENIX, ARIZONA

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Arizona Department of Health Services
Phoenix, Arizona 85007

Paragraph #	Response
1 and 2	The U.S. Environmental Protection Agency's Interim Primary Water Quality Standards published in the Federal Register, March 14, 1975, (Vol. 40, No. 51, Part II, pages 11990-11998, paragraph 141.11) state that "a domestic water supply should not contain nitrate nitrogen concentrations in excess of 10 ppm."

Ms. Barbara Smith
Center for Environmental Studies
Arizona State University
Tempe, AZ 85281

re: 75-80-0010

"Draft Environmental Statement on BLM Timber Management Practices"

The environmental impact of timbering practices is destructive: consequently, disturbance of forests and activities therein should be restrained to the point of minimum.

The "summary" p. 3 carries the understatement of the piece: " Clearcutting, heavy partial cutting, road cuts and fills and occasional massive soil movements will detract from the natural appearance of the forest."

These practices promote the termination of the future, and should be treated in accordance. It is to be hoped that the notes on the destruction of forestry carried in 75-80-0010 do reflect the attitude of the BLM regarding forestry, rather than the quotation cited above.

Respectfully,
R. J. Becker

R. J. Becker
Prof. Public Affairs
Arizona State University

4-22-75

Summary of Other Comments
Received from State of Arizona

The following Arizona agencies/organizations submitted form responses through the Arizona State Clearing House on the draft environmental impact statement, Timber Management and indicated that they had " no comment on this project " except as noted below.

State Liason Officer, AORCC
State Water Commission
Department of Land
Agriculture and Horticulture Department
Office of Economic Planning and Development
Indian Affairs Commission
Arizona Bureau of Mines [1]
Southwestern Minerals Exploration Assoc. [2]
Civil Rights Division, Department of Law

[1] Form signed/dated but oterwise unmarked.
[2] Indicated that " proposal is supported as written."

CLAIRE T. DEDRICK
SECRETARY

EDMUND G. BROWN JR.
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETARY
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Navigation and
Ocean Development
Department of Parks and Recreation
Department of Water Resources

Air Resources Board
Colorado River Board
San Francisco Bay Conservation and
Development Commission
Solid Waste Management Board
State Lands Commission
State Reclamation Board
State Water Resources Control Board
Regional Water Quality Control Boards

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

JUL 2 5 1975

Bureau of Land Management
U. S. Department of the Interior
18th & "C" Streets, N.W.
Washington, D. C. 20240

Gentlemen:

The State of California has reviewed your report entitled "Timber Management, A Draft Environmental Statement", dated January 1975, which was submitted to the Office of Planning and Research (State Clearinghouse) within the Governor's Office. This review fulfills the requirements under Part II of the U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969.

The Statement has been reviewed by the Departments of Conservation, Fish and Game, Food and Agriculture, Parks and Recreation, and Water Resources; and the State Water Resources Control Board. Our comments on the draft statement are set forth below.

Fish and Wildlife Concerns

1- The Department of Fish and Game has reviewed the draft environmental statement and recommends that the Bureau consider two general recommendations in addition to the specific item discussed in its report (attachment).

2- First, the total area considered for timber harvest is minor in relation to the total amount of timberland in California. It is also composed of scattered parcels throughout California. Most of these areas have high fish, wildlife, and other resource values.

3- It is recommended that the priorities for management of these lands be evaluated in relation to nontimber uses and to the surrounding lands before final management decisions are made for these lands.

4- Second, the key to determining the specific impacts upon fish and wildlife of the timber harvesting program is whether or not fish and wildlife habitat needs are adequately considered in connection with each timber sale. In areas where fish and wildlife resources and their habitat may be significantly adversely affected by timber operations, the Bureau should prepare complete environmental impact statements on individual timber sales. The statements should identify the expected impacts along with proposed mitigation measures.

5- The attachment expresses in more detail those concerns and is to be considered as an integral part of these comments.

California Division of Forestry Concerns

The key statement in the EIS summary states, "No major changes in the current program are proposed."

6- This is a voluminous report covering the full range of environmental concerns, but in a very general manner. It is intended to be a base report to serve as a "foundation and framework for subsequent environmental analyses and statements which may be required for timber management programs on a state, district or individual forest basis." Thus, its very general nature may be justified. The report treats California's 250,000 acres of BLM lands grouped with 1.6 million acres in 11 western states.

Major planned timber management practices having environmental impact in the 11 state group including California area:

7-

1. Partial cutting of 40,000 acres of mature timber.
2. Clear-cutting of 800 acres of mature timber.
3. Reforestation of 2,400 acres.
4. Site improvement through scarification of 300 acres prior to reforestation.
5. Precommercial thinning of 600 acres of unmarketable immature timber.
6. Brush, weed, and hardwood control on 200 acres through approved chemical treatments.
7. Commercial thinning of 500 acres of marketable immature timber.
8. Construction of approximately 100 miles of road.

8- It would be helpful if these activities were identified more specifically to area; for example, where will the 800 acres of clear-cutting take place? The reader is not informed if any of the listed practices, other than some form of timber harvesting, will be conducted in California.

9- The report states that the current timber management plan for these lands was developed in the mid-1960s. A 54 million board foot cut is projected for California in 1975 with no significant change in annual cuts foreseen in this decade. Therefore, no significant change in economic impact is involved. The level of cut in California seems conservative (216 bd. ft/acre) but insufficient facts are given to make a definitive judgement.

10- Although California's Z'berg-Nejedly Forest Practice Act of 1973 does not apply to federal lands, timber harvesting on BLM lands in California should at least equal practices required on state and private lands.

Water Quality

11- The general draft plan does not provide sufficient information to determine the impacts of individual sales carried out under its provisions. Accordingly, the State Water Resources Control Board requests the opportunity to review the environmental documents for each proposed individual operation and to be notified of each such operation well in advance of the scheduled start of work.

Archeological and Historical Resources

12- In keeping with the Procedures pursuant to the National Environmental Policy Act of 1969, it is suggested that the section on mitigation of cultural resources, specifically archeological and historical resources, be reappraised and organized to specify exactly what actions will be taken in compliance with "Procedures for the Protection of Historic and Cultural Properties" as specified in 36 CFR, Part 800.

Conclusion

13- In conclusion, it is requested the final statement respond to the concerns and include the views of the State as set forth in these comments. It is also requested that the Bureau of Land Management state its commitment that complete EIS's will be published well in advance of the scheduled start of work so that the State and other agencies can adequately review the documents and comment on alternatives and mitigation measures needed to reduce environmental impacts.

Thank you for the opportunity to review and comment on the draft statement.

Sincerely,
L. Frank Goodson
for
CLAIRE T. DEDRICK
Secretary for Resources

Attachment
cc: Director of Management
Systems
State Clearinghouse
Office of Planning and Research
1400 Tenth Street
Sacramento, California 95814
(SCH No. 75033127)

Attachment

DEPARTMENT OF FISH AND GAME COMMENTS

TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT

U. S. BUREAU OF LAND MANAGEMENT

MAY 7, 1975

This statement covers 250,000 acres of commercial forest lands in California. The Department of Fish and Game is concerned over the continuing failure of commercial forest land management agencies to recognize that the long term effects of intensive timber management will result in simplification of the 14- ecosystem, which in turn will result in reduction of fish and wildlife resources. Habitat diversity is the key element of a productive ecosystem for fish and wildlife. Maintenance of today's level and diversity of fish and wildlife on commercial forest lands will require reservation of lands for wildlife over and above those considered in this forest management statement.

Department evaluations of various logging methods indicate fish and wildlife resources are significantly impacted by those practices which result in the greatest scarification of vegetation and soils. The initial impact of these 15- practices on fish and wildlife is devastating; however, after the first year or two, as vegetation cover increases, terrestrial wildlife forms recolonize the logged areas. If silvicultural management actions to reduce competition are withheld, these colonizers begin to successfully reproduce and as subclimax vegetation increases wildlife populations increase.

Optimum conditions for deer last 5-10 years on forest lands managed for conifers. Suboptimum conditions last another 5-10 years. Assuming a 100-year cutting 16- cycle, optimum conditions will be sustained for only 10 years (1/10) of the cycle and suboptimum for another 10 years. Thus, at best, vegetative conditions for deer and other subclimax associated wildlife lasts about 20 years and for 80 years conditions become increasingly adverse.

We believe that a base population must be sustained on existing forest lands through preservation of specific lands and habitats or niches, together with management of reserved lands to sustain the colonizers necessary to fill the 17- new temporary niches created by even-age logging. We further submit that logging can be used to purposely create subclimax associated wildlife niches, to enhance the distribution of wildlife population centers and thus expedite the temporary colonization of logged sites that would otherwise be outside the range of existing resident populations.

The implementation of a silvicultural system with emphasis on even-age manage- 18- ment and maximum stocking levels without reservation of existing wildlife habitat niches will create a pattern of monotype timber of low wildlife diversity and quantity.

Fishery resources, which are dependent on aquatic habitat, will also be destroyed by intensive silvicultural management. This has occurred most frequently in California in association with clearcutting, seed tree and 19- shelterwood logging where soil scarification has been extensive and logging has been conducted on steep slopes above yearlong streams, or when the logged site encompassed intermittent steam drainages. Clearcut logging has not created fishery related problems on ridge tops or flats or where erosion from runoff is not excessive.

Siltation during periods of low water flows results in destruction of stream 20- habitat, aquatic vegetation, increased temperatures and general impairment of water quality. Since logging reentry occurs frequently (2-5 years) in most

drainages subjected to clearcutting practices, sedimentation occurs annually and aquatic resources are steadily diminishing. The south fork of the Trinity River has become relatively unproductive since initiation of clearcut logging on South Fork Mountain. Clearcutting increases the natural rate of eutrophication of water bodies.

21- We submit that additional limitations on logging methods and techniques are necessary to protect our aquatic resources and maintain existing water quality standards.

Of the various alternatives considered in this statement, the two that seem most compatible with fish and wildlife resources are: (a) no timber management, or (c) other timber harvesting practices that preclude clearcutting. We base this on the following facts and assumptions:

22-
A. Commercial forest lands administered by the Bureau of Land Management in California total only 250,000 acres. This represents less than .05 percent of the total U. S. Forest lands.

B. Most of these 250,000 acres in California occur in parcels of less than 640 acres.

C. These lands generally occur as islands of public lands surrounded by private lands.

D. Past management practices either on the Bureau of Land Management lands or surrounding private lands have increased the importance and value of these islands for wildlife.

E. Alternative C proposes only partial removal (20 to 30 percent) of the stand volume at initial entry and removal of the remainder over two or more entries at 15-year intervals. This reduction of entries and elimination of clearcutting should resolve some of the fishery and aquatic resource problems associated with more intensive timber management in California.

We submit that since Bureau of Land Management lands represent such a minor part of the existing or potential commercial forest management base in California and that their small size and location in relation to private and other public lands will and does cause administrative management problems, 23- these lands should be managed primarily for fish, wildlife, recreation, grazing, and watershed. Timber management should be considered as a secondary or incidental benefit or excluded. Extensive areas of contiguous ownership or Site I and II northcoastal timberlands might be excluded from this general proposal.

The following comments refer to specific sections of the statement as indicated:

Page III-7. 4. Recreation. This section should discuss the effects

24- intensive forest management will have on recreation from such things as siltation of streams, reductions and loss of aquatic vegetation, losses of spawning gravels, and

increased water temperatures. The edge effects and improved forage benefits associated with cutover areas will be largely balanced by the losses of habitat associated with erosion and siltation of the highly 24- (cont.) productive aquatic habitats, by road construction, by forest land development practices such as scarification, brush-hardwood control, herbicide (weed) control, mechanical brush cutting and burning. This simplification of the biotic community will have the adverse impact on some forms of recreation use in the intensively managed forest communities.

25- Our experience with intensive logging has shown us that most segments of the public who enjoy either the commodity values of the forest, such as hunters and fishermen and those who enjoy a wilderness experience, such as camping, picnicking, hiking, or bird watching, will all have less favorable recreation experiences under the intensive timber management program. Generally speaking, there are adequate roads throughout our forested lands in California to obtain proper utilization of our fish and wildlife resources. Additional roads will only eliminate additional habitat and reduce the wilderness experience associated with roadless areas.

Page III-11. 9. Wildlife.

26- The statement that even-aged management and all it portends will have a short term impact on wildlife is a comprehensive generalization and is not consistent with the statement made on page III-20. The optimum forest situation for all wildlife would probably be uneven-age class stands of mixed species including hardwoods interspersed with brush fields and meadows. Sporadic successional disturbances such as fire followed by natural regeneration through vegetative succession would provide for maintenance of this condition. These conditions are not considered to be compatible with optimum timber production under intensive management; likewise intensive timber management does not provide optimum wildlife conditions.

27- The statement on page III-12 and 13 that --"the accessibility provided by roads to fishermen represents the most significant impact on aquatic wildlife populations" is true in part if we are considering terrestrial wildlife and the impact of intensive people use. However, since this section is summarizing the environmental impacts of timber management, our experience has shown this paragraph would be better concluded by the following:

> "In general, logging roads and scarification of logged areas will produce prolonged sedimentation that, together with increased public recreational use provided by these new roads, will have a significant adverse impact on aquatic habitats associated with fish and wildlife resources.

Page III-15. 28- We cannot concur with the environmental impacts displayed in the capsule view unless these are short-term impacts (10-20 years). Under Environmental Components we believe Recreation (hunting) along with the other recreational pursuits will be "Adversely" impacted by intensive management of Bureau of Land Management lands in California. Vegetation in all forms except those for which intensive management is directed (coniferous trees) will be adversely affected in California. The objectives of intensive management in practice have led to simplification of the flora with elimination of some species. This statement might be corrected by the following vegetation (health and vigor of conifers). Vegetation (Diversity) will be reduced and therefore has an adverse impact.

29- Wildlife (Herbivores) will suffer an adverse impact in California, consistent with long-range impacts on vegetation and loss of habitats to roads, scarification and reforestation; logging will result in short-term benefits that are offset by habitat impacts from other uses. Intensive forest management practices in California have resulted in greater losses than benefits, primarily due to brush-to-tree conversion, hardwood control, and extensive use of herbicides that have reduced the benefits associated with logging.

Page III-16 through III-99. Environmental Impacts of Timber Management. This section speaks of timber management without consideration of mitigative measures to reduce adverse impacts.

30- We generally concur with this section except for those impacts covered in the preceding statements. We would also add the following findings from studies of timber management practices in California.

31- Brush-to-conifer conversion projects on 17 sites evaluated in California have generally resulted in a 50 percent reduction in deer use.

32- Herbicide spray treatments in a reforestation project resulted in a 50 percent reduction in deer use. A follow-up application resulted in an additional 50 percent reduction in use (Sierra Forest 1973).

33- Clearcutting with little or no follow-up herbicide treatment or application of other control measures has resulted in deer increases from 17 per square mile in the mixed fir forest types in the vicinity of patchcuts to 29 per square mile on

33-(cont.) the patchcuts themselves (North Kings, Ashcraft 1974). It should be noted, however, that the deer herd has not increased and it is conjectured that the logging benefits are not presently replacing the habitat losses associated with overall forest management programs and public uses. Roads, subdivisions, work centers, campgrounds, and other recreational use facilities are directly eliminating a significant acreage of habitat each year, and indirectly the use of these facilities by more and more people for a greater portion of the season is resulting in significant fish and wildlife losses.

34- Section IV, Mitigative Measures to be Followed in Timber Management, pages IV-1 through IV-54, is very confusing and redundant. Rather than add to this, we have commented on the various actions that require new or additional mitigative measures to protect fish and wildlife resources.

35- In the high elevation Red Fir Zone, Mountain Hemlock and Timberline Zones, wildlife cover needs are very important because of its scarcity and extremely slow growing rate. Planning in these zones should place high priorities on wildlife cover and the benefits of cover retention on fragile soils.

36- Logging, if necessary, should be directed to methods other than clearcutting and seed tree cutting, or other timber management logging methods that result in extensive scarification. Vegetative retention is paramount in these fragile slow growth biomass.

37- In all zones tractor logging and other methods that result in extensive soil disturbance should be limited to slopes with gradients of less than 35 percent rather than 45 percent.

38- Water barring and seeding of skid roads with herbaceous species will mitigate for some soil, vegetative, wildlife, aquatic resource, and water quality impacts.

39- Transportation - In planning for and laying out roads, their impact on fragile biotic communities must be considered. For example, transportation systems should avoid important wildlife propagation units (usually associated with herbaceous and riparian openings such as seeps, springs, streamsides and meadows), wildlife population centers, big game migration corridors, and holding ranges. If these key habitats can not be avoided, temporary roads should be considered, and these roads removed and reseeded as soon as possible after logging.

40- The impact of road construction on habitat together with noise, dust, and people use disturbances can result in the direct and indirect loss of entire migratory elk, deer, antelope, or sheep herds. Migration corridors can often be bisected by roads without significant damage if traffic speed and numbers are minimal. When transportation use is expected to be high during spring and fall periods, roads that bisect migration corridors should be designed with overhead or underpass crossings at strategic locations to permit normal movements of migration herds.

41- The use of buffer strips should be expanded to include seasonal stream channels as well as perennial channels. This will also protect riparian habitat and aquatic vegetation, which represent the most productive vegetative types for wildlife in the forest community.

42- Terrestrial Vegetation - Mitigation measures in this category make no mention of the need to reserve key foraging, cover and propagation vegetative areas on timberland soils for wildlife. Rather, it is assumed that "forest development" when confined to small areas will mitigate the wildlife impacts. Since long term actions associated with "forest development" are directed to insuring environmental conditions favoring tree regeneration, any benefits that might occur will be of short duration. The long term (over 20 years) results will be a gradual reduction of the wildlife benefits and on key areas this could impact the carrying capacities of entire populations or herds of big game animals. Key habitats, niches, holding ranges, migration corridors, propagation units and population centers must be located and included in early planning to determine land use conflicts and explore management alternatives.

43- Cutting Practices - Mitigative practices refer to cutting practices that will result in environmental conditions favorable to tree regeneration. There are no mitigative practices directed to wildlife. Mitigative cutting practices should include logging directed to create and improve or sustain forage and cover in or around key areas. For example, logging can be directed to improve or create temporary propagation units around large meadows. By reservation of 3-5 acres from reforestation within the logged area and adjacent to small grazed meadows, propagation units can be created; this will increase the productivity for most wildlife species.

44- Logging Methods - Logging methods should be altered to accommodate the needs of wildlife on key areas. Logging on migration corridors and holding ranges must be altered to promote the development of and maintenance of understory vegetation. The land use needs, maintenance of shrub cover and forage necessary to sustain migratory populations must be recognized and deducted from the timberland production base, if these populations are to be preserved.

45- Domestic Livestock - The mitigation of livestock needs should be discussed either in terms of complete compensation or in reductions in the allocated AUMs. If compensation is not accomplished, livestock use encroaches on wildlife forage capacities with a resultant drop in wildlife numbers. Studies on the North Kings (Sierra Forest) Deer Herd summer range indicate that cattle compete heavily with deer and other wildlife for the forage on clearcuts. This in effect reduces the forage and cover benefits of logging for wildlife.

The adverse impacts referred to in Section V, pages V-1 through 13, have been commented on in prior sections.

46- Section VI deals primarily with productivity in terms of timber production. The long term impact on the flora and fauna will be a reduction in both number and species. There will also be an adverse impact on the fish and aquatic wildlife.

47- Our comments on the various timber management alternatives presented in Section VIII were present in the format of this letter.

48- All of our comments have been based on the conditions that exist in California. We believe that intensive timber management, if conducted in this State on

Bureau lands, will have an adverse impact on fish, wildlife and related resources. Because of the adverse impact timber harvest will have on fish and wildlife resources, the small amount of Bureau of Land Management acreage that is timberland and the probable administrative problems due to small parcel size and isolated location, we believe the Bureau of Land Management should reevaluate the management priorities for these lands.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

The Resources Agency of California
Sacramento, California 95814

Paragraph #	Response
1, 2, 3 and 4	Timber management programs are an outgrowth of the Bureau Planning System described in Chapter I(C). This system identifies and evaluates all natural resource values which are then integrated into comprehensive Management Framework Plans (land-use plans). These plans utilize, to the extent practical, multiple-use concepts so as to provide a mix of natural resources including timber, wildlife, recreation, water, and others to meet public demands. Public input into the Bureau Planning System is described and required at all stages of the planning process. In areas where fish and wildlife resources as well as other resource values could be impacted by timber management activities such as a timber sale, a site-specific environmental analysis, or as determined necessary, environmental impact statement must be prepared to determine the impact of the timber operations on the specific environment. The need for mitigative measures are also identified and tailored for the "site-specific" situation.
5	Appropriate responses to these comments are provided below.
6, 7, and 8	Acreages subjected to timber management activities for the 11 contiguous states (excluding western Oregon) have not been segregated on a state-by-state basis because of past instability in the respective timber management programs. Timber harvests from Bureau lands in California, for example, range from 9 million board feet in 1973 to 35 million board feet in 1975. Harvest volume in 1976 is expected to be approximately 12 million board feet. Thus, it is difficult to provide reliable and meaningful acreage estimates for the various harvesting practices used. As the Bureau acquires more up-to-date inventory and planning data for these lands, the forestry programs in states outside of western Oregon will stabilize. In turn, more reliable, annual acreage estimates will be available for the various timber management activities.

The Resources Agency of California
(Continued)

Paragraph #	Response
9	While preliminary in nature, the latest estimates indicate an annual allowable cut of some 40 to 45 million board feet for BLM forest lands in California. The major reason the estimated level of cut "seems conservative" is due to the fact that an estimated 40 million board feet in annual production will be foregone in order to protect or provide for nontimber values and uses which conflict with full timber production.
10	Bureau policy requires coordination and cooperation with state agencies and applicable state laws in managing the forest resources. The Z'berg-Nejedley Forest Act of 1973 is only one of the many state laws which the Bureau recognizes so as to meet the demands of the American public while protecting the environment.
11	Bureau policy requires that environmental analysis records (EAR's) be prepared for each timber management activity prior to the on-the-ground actions. These EAR's are available for review by interested agencies, individuals, and organizations.
12	Chapter IV(J,3) has been revised to reflect these comments.
13	State comments have been considered in preparing the final environmental impact statement. Appropriate revisions have been made in the chapters and paragraphs as noted in our response.
	Bureau guidelines require that the public be notified of an impending Bureau action. Type of notification and the length of comment period on an environmental analysis record depend on the significance of the proposed action. Draft Environmental Impact Statements are given wide publicity and distribution. Comment periods for such documents exceed 45 days.

The Resources Agency of California
(Continued)

Paragraph #	Response
14	See Bureau's response to paragraphs 1, 2, 3, and 4.
15	The final environmental impact statement recognizes and discusses these impacts.
16, 17 and 18	We agree with these concepts. Further, it is our opinion that the proposed timber management program, which is a derivative of the Bureau Planning System previously mentioned, provides the diversity you suggest.
19	These unmitigated impacts are recognized in Chapter III of the final environmental impact statement.
20 and 21	Bureau policy concerning clearcutting is in accordance with the policy guidelines contained in The Report by the Subcommittee on Public Lands on Clearcutting on Federal Timberlands (Appendix D). These policy guidelines are carried out in the course of resource inventory, land-use planning, environmental analysis, and on-the-ground enforcement of the environmental protection measures.
	Good land-use planning will be the Bureau's first line of defense in protecting and enhancing environmental values. Additionally, operational practices, i.e., logging methods and techniques, will be designed and selected to fit site-specific situations. Where environmental amenities cannot be maintained within acceptable parameters, timber management operations will be subjugated to other resource values.
22	Though alternatives A and C (formerly B) appear most compatible with fish and wildlife resources, these alternatives (we believe) are not the most compatible with other resource uses and values. The proposed action, on the other hand, provides opportunity to manage the lands for multiple uses and values.

The Resources Agency of California
(Continued)

Paragraph #	Response
23	Land use decisions, such as this, are the function of the Bureau's Planning System discussed in Chapter I. Further, land-use problems are often highly complex and require rigorous study and evaluation. Land-use decisions based merely on the size or the location of land parcels are contrary in nature and unacceptable within the framework of sound land and resource use planning.
24	Chapter III has been revised to include these comments.
25	Timber management activities may decrease the recreation experience for those seeking commodity values but will provide a greater quantity and area to choose from because of increased access. In this context, the timber management program will generally be more favorable to those segments of the public seeking commodity values of the forest.
26	This section has been revised and expanded to consider the loss of old-growth timber on wildlife populations.
27	Chapter III(A) has been deleted to avoid redundancy.
28 and 29	We believe the summary of impacts, Table VIII-1 formerly Table III-1), accurately states the cumulative impacts (type and magnitude) on a programwide basis. The final environmental impact statement further recognizes that the type and degree of impact will vary depending upon the management practice applied and the environmental component and specific environmental element involved.
30, 31,32, and 33	Your references to timber management and the resulting changes in deer populations provide additional background and support for our analysis of impacts to wildlife.
34 and 35	Timber management activities, if any, in these zones will consider the fragile soils and wildlife values. A site-specific environmental analysis will be prepared for each timber management action, i.e., timber sale, thinning contract, reforestation project, etc.

The Resources Agency of California
(Continued)

Paragraph #	Response
36	Silvicultural systems will be selected to fit the site conditions and tree species involved.
37	Chapter IV has been revised to indicate that tractor logging will be limited to slopes of 35 percent or less as a practical maximum.
38 and 39	These mitigative measures are discussed in Chapter IV of the final environmental impact statement.
40	Chapter IV(G,1), Transportation, has been revised to reflect these comments.
41	Critical wildlife habitat such as that which may occur along seasonal channels will be identified by the district wildlife and/or fisheries biologists. Where necessary, road locations will be altered or buffer strips required to protect valuable habitat areas.
42 and 43	Chapter IV(G,1) has been revised to reflect these comments.
44	Chapter IV has been revised to include this comment. It should also be pointed out that key wildlife areas are identified, inventoried and evaluated in the Bureau Planning System described in Chapter I. Those areas and environments judged critical to wildlife needs are generally excluded from the lands available for timber production.
45	Impacts of livestock grazing on wildlife will be evaluated through the Bureau Planning System and the environmental analyses required for grazing actions.

The Resources Agency of California
(Continued)

Paragraph #	Response
46	Chapter VI(G) has been expanded to indicate the long-term impacts on flora and fauna.
47	Refer to response for paragraph 22 above.
48	Land-use decisions, including those of determining lands which are available for timber production, are functional components of the Bureau Planning System. Further, where land-use decisions have included timber operations as viable opportunities, no on-the-ground timber activities (i.e. sales, reforestation) can occur until an environmental analysis is prepared to identify and evaluate the site-specific impacts, including those on fish and wildlife resources. The need for mitigative measures is also identified in the environmental analysis document.

Colorado
Division of Planning

Richard D. Lamm / Governor

1845 Sherman Street / Denver, Colorado 80203

Philip H. Schmuck / Director

Department of Local Affairs

Phone / (303) 892-2351

May 12, 1975

Director (340)
Bureau of Land Management
Department of the Interior
18th and C Streets N. W.
Washington, D. C. 20240

SUBJECT: Draft Environmental Statement
National Timber Management Program

Dear Sir:

The Colorado State Clearinghouse has reviewed the Draft Environmental Statement for the BLM National Timber Management Plan, and has received comments on the Plan by several State agencies.

1- In general, we find the statement very informative, but much of its content is irrelevant to Colorado. We agree with the comment of the State Forester (enclosed) that statements should be for smaller areas--certainly not larger than one state. This would permit a sharper focus on area-specific issues without making the Statement more unwieldy than it already is. We also commend the other comments of the State Forester to your attention, although we do not necessarily endorse all his recommendations without qualification.

2- In summary, we believe that consistency with the intent of the NEPA, requires that environmental statements be more sharply focused on smaller regions, and we question the usefulness of the large report covering several diverse regions.

Sincerely,

Philip Schmuck

Philip H. Schmuck
Director, State Clearinghouse

PHS/RB/vt
Enclosures

cc: See attached list

Bureau of Land Management
RE: National Timber Management Program DES
May 12, 1975
Page 2

cc: Betty Miller, Executive Director, Department of Local Affairs
Jim Monaghan, Assistant to the Governor on Natural Resources
Robert Siek, Assistant Director, Department of Health Environmental Program
W. E. Marshall, Executive Director, State Historical Society
Jeris Danielson, Deputy State Engineer, Division of Water Resources
Jack Grieb, Director, Division of Wildlife
Thomas B. Borden, Colorado State Forester

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Colorado Division of Planning
Denver, Colorado 80203

Paragraph #	Response
1 and 2	As indicated in Chapter I of the final environmental impact statement, the Bureau will prepare site-specific environmental impact statements covering each of the sustained-yield units in western Oregon. These statements will encompass over 50 percent of the Bureau's total timber production base (excludes Alaska) and 92 percent of the total volume harvested annually from Bureau lands. Site specific environmental impact statements will also be required for the timber management programs for the Coeur d'Alene District, Idaho and the Ukiah District, California. Additionally, Bureau policy requires site-specific environmental analysis on all actions, including timber sales, reforestation projects, etc.,which could affect the human environment.

75-108

COLORADO DEPARTMENT OF HEALTH

4210 EAST 11TH AVENUE • DENVER, COLORADO 80220 • PHONE 388-6111
Edward G. Dreyfus, M.D., M.P.H., Executive Director

May 7, 1975

Mr. Richard L. Brown, Principal Planner
Colorado Division of Planning
1845 Sherman Street
Denver, CO 80203

Re: BUREAU OF LAND MANAGEMENT - TIMBER MANAGEMENT PLAN

Dear Mr. Brown:

The Colorado Department of Health has reviewed the above-referenced document and offers the following comments:

The Draft Environmental Impact Statement satisfactorily describes the expected impact on water quality from Bureau of Land Management timber management practices and provides reasonable mitigating measures for their control. Since the plan covers all timber lands in the Western United States, including Alaska, it is impossible to outline the specific mitigating measures for an individual site in Colorado. However, if the general water quality protection measures are applied as proposed, the impact on Colorado watercourses should be minimal.

1- There is a need for caution and a high degree of supervision where chemical toxicants and other practices will possibly effect potable water supplies in Colorado. Solid waste practices should be conducted so as to be compatible with Colorado rules and regulations.

2- Except for temporary increases in particulate levels due to fugitive dust emissions from road construction and open burning, the proposed project should not adversely affect the ambient air quality. We would appreciate an opportunity to make a more detailed review if specific areas and practices are planned in Colorado.

Thank you for the opportunity to review this document.

Sincerely,

Robert D. Siek
Assistant Director, Department of Health
Environmental Health

RECEIVED
MAY 12 1975
DIVISION OF PLANNING

RDS/pl

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Colorado Department of Health
Denver, Colorado 80203

Paragraph #	Response
1	The need for caution is recognized. State air, water quality, and solid waste disposal laws, rules, and regulations will be met.
2	Public review and comment on site-specific environmental impact statements and environmental analysis are required Bureau procedure.

THE STATE HISTORICAL SOCIETY OF COLORADO

Colorado State Museum, 200 Fourteenth Avenue, Denver 80203

April 21, 1975

Mr. Richard L. Brown
Principal Planner
Colorado Division of Planning
1845 Sherman Street
Denver, Colorado 80203

RE: Bureau of Land Management/Timber Management Plan

Dear Mr. Brown:

We received and have reviewed the Draft Environmental Impact Statement for the Bureau of Land Management's timber management plan as of April 2, 1975.

1- There are many old cabins, stage stops, abandoned mining camps and other known and unknown historical and/or archaeological sites throughout the Coniferous Forests. Alterations in the surrounding areas of these sites could affect the visual settings and backdrops and perhaps weaken their values. Road access into the areas could subject sites to vandalism and construction of these roads can, sometimes, obliterate old trails or archaeological remains.

2- Surveys must be conducted prior to any timber management practices for both historical and archaeological sites. Upon finding such sites, an evaluation must be made. Until such work is completed no actions will be taken that could alter the area or disturb the sites.

Lands on which there are known National Register properties or properties eligible for inclusion in the National Register shall not be subjected to any timber management practices, as stated on page IV-53 of the Draft Statement.

We look forward to working closely with the Bureau of Land Management with their timber management practices as they occur in the State of Colorado.

For the Colorado State Historic Preservation Office.

Cynthia Emrick
Cynthia Emrick
Acting State Historic Preservation Officer

cc: Dr. James J. Hester, State Archaeologist

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APR 23 1975
DIVISION OF PLANNING

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

The State Historical Society of Colorado
Colorado State Museum
Denver, Colorado 80203

Paragraph #	Response
1	These potential impacts are recognized in the final environmental impact statement.
2	Chapter IV(J)(3 and 4) has been revised and expanded to reflect this comment.

Richard D. Lamm
Governor

C. J. KUIPER
State Engineer

DIVISION OF WATER RESOURCES
Department of Natural Resources
300 Columbine Building
1845 Sherman Street
Denver, Colorado 80203

April 14, 1975

Richard L. Brown, Principal Planner
Colorado Division of Planning
1575 Sherman Street
Denver, Colorado 80203

Re: Environmental Statement Review
BLM Timber Management Plan

Dear Mr. Brown:

We appreciate the opportunity to review this environmental statement. The following apply to water resources interest:

1- 1. It is recognized that the design of timber harvest areas, including their size, shape, and orientation, may significantly affect the watershed runoff characteristics. In Colorado, where water rights are determined by the doctrine of prior appropriation, downstream rights have been established based upon historically available runoff. We suggest the use of design criteria which will minimize detrimental effects to runoff characteristics, and where possible, to maximize the amount of water available for diversion to beneficial uses downstream.

2- 2. Timber cutting operations should be controlled to avoid structural damage to water channels. Direct disturbance to the stream channel, including cross-stream skidding and channel deflections, should not be permitted. Top and cull logs falling into streams should be removed so as to not dam streamflows. No structural modifications should be permitted to diversion structures, headgates, ditches, canals, or reservoirs without specific permission from the owners thereof.

Very truly yours,

Jeris A. Danielson

Dr. Jeris A. Danielson
Deputy State Engineer

JAD/WWB:mvg

APR 17 1975
DIVISION OF PLANNING

Bureau of Land Management Responses to Comments From:

Colorado Division of Water Resources
Department of Natural Resources
Denver, Colorado 80203

Paragraph #	Response
1 and 2	The practices you suggest are among the many mitigative measures cited in Chapter IV(D) of the final statement which will be employed to protect and enhance water and water quality.

STATE OF COLORADO
Richard D. Lamm, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
Jack R. Grieb, Director
6060 Broadway
Denver, Colorado 80216 (825-1192)

April 18, 1975

Mr. Richard L. Brown,
Principal Planner
Colorado Division of Planning
1845 Sherman Street
Denver, Colorado 80203

Dear Dick:

The Division of Wildlife has reviewed the Draft Environmental Statement for Timber Management prepared by the Bureau of Land Management. The draft is very well prepared and provides a comprehensive assessment of the impact on wildlife resources.

Each proposed timber sale, however, must be evaluated in the field and sufficient time allotted to resolve conflicts. This Division will continue to work with the Bureau of Land Management in Colorado during each evaluation.

Sincerely yours,

Jack R. Grieb

Jack R. Grieb
Director

JRG:jb
cc: Harris Sherman
Regional Managers

Draft Environmental Statement Review
of the Timber Management Plan D.E.I.S.
Prepared by the Bureau of Land Management, USDI
Colorado State Forest Service
April 15, 1975

1- This Draft Environmental Impact Statement is large and unwieldy. For most readers it is an overwhelming document that does not lead to a specific idea of the extent of environmental impact which may result from the Plan. This occurs because the Statement attempts to address in a very general way items which are, by their nature, specific. In other words, the attempt to generally describe the environment, logging methods, and the probable result is frustrated by the fact that environmental impacts occurring from this type of proposal are actually site specific. An attempt to describe the entire United States, all possible logging methods, and predict environmental impact is just not practical.

2- Certain concepts advanced by the Environmental Impact Statement are, however, of particular interest. It is from these concepts that the site specific impacts will arise. In fact, the Statement should have addressed itself to impacts which are likely to result from the adoption of timber management concepts proposed in the program for BLM lands. For example, it appears to be the intent of the Bureau of Land Management to convert all of the old growth timber stands on BLM lands to second growth regulated forests. The Statement does not describe the process that BLM field units will use to differentiate between old growth forests on commercial forest lands and old growth forests that are on marginal lands. It is possible, therefore, that this concept will be interpreted as a policy to cut all old trees regardless of site productivity. If this is true, then the Timber

Management Program will certainly result in some adverse, irreversible, and irretrievable impacts. Some distinction must be made between old growth forests which are, in fact, a stock resource and old growth forests which are, in fact, a renewable flow resource. The Statement does not appear to address this basic type of problem.

The Statement also does not address basic philosophies relating to harvest methods. Adoption of partial cutting methods to achieve greater aesthetic balance does have some side effects. It means that additional roads will have to be built. This, in turn, will remove some lands from
3- further forest production. It follows that this action may, therefore, be an irreversible and irretrievable commitment of the forest resource into the future. A comparison of the benefits of short-run protection of aesthetic beauty and the long-run losses of productivity must be made at some point. These basic kinds of comparisons should be made in a Statement as general in content as this one.

The Statement should also address some fundamental questions relating to harvesting policy. Most adverse environmental impact and associated public criticism occurs when harvesting takes place in areas which are environmentally fragile. The Statement should define a planning process which will identify these environmentally fragile areas and insure their protection. Harvesting policy also can affect area economics. On page III-87 the
4- statement is made, "No significant adverse effects on employment are felt to be associated with timber management." This general statement is simply misleading. In area which is predominantly recreational in character, the economy is typically based on recreation income. Timber management activities in these areas can affect recreational and scenic quality and, therefore, may result in adverse effects on recreational-based employment.

Harvesting policy also affects industrial development and commitment. If the very productive commercial forest areas are specifically identified and designated in the planning process, it is possible to prescribe an intensive management program which will yield improved rates of return. This identification could also be used as a basis for cooperative programs with the forest industry to develop an improved economic base in those areas. Intensive programs carried out on highly productive commercial lands would insure industry of a continuing timber supply and would allow industry to make continuing capital investments to improve their efficiency and utilization of forest resources. I do not see that the Timber Management Program proposes an identification process or a cooperative program with industry which is essential for the production of long-run benefits for our Nation.

In summary, the Statement appears to address and answer the wrong questions. The Statement should not be a basic text on regional geography, nor a review of classic silvicultural methods for timber management. It should address national needs and develop a multi-resource viewpoint. It
5- is important that an integrated philosophy of resource management be stated which seeks to enhance other values that the public needs. It should not dwell on single factor production and vague environmental references. In our opinion the Timber Management Program should set forth several objectives:

1) The Program should describe an inventory process which will insure that productive areas can be identified and located on the ground for intensive management.
2) The Program should prescribe minimum safeguards for protecting the environment during harvesting. The safeguards should be transferrable to on-the-ground situations.

3) The Program should describe a process which will be followed to insure that other values in the forest area will be integrated with timber management planning and sale layout.
4) The Program should describe a process which will be followed to insure the integration of timber management planning on BLM lands with adjacent state, private, and federal lands.
5) The Program should describe cooperative action which will be taken to encourage industry to make the best utilization of commercially productive forest lands.
6) The Program should describe a reforestation plan which will encourage tree planting on cut-over lands and existing non-forested lands which have the potential for growing forests.
7) The Program should include a discussion of silvicultural systems from the standpoint of environmental and economic trade-offs which will occur as a result of using one system over another.

We find the Draft Environmental Statement to be deficient in these aspects and suspect that the Program is similarly deficient.

Bureau of Land Management Response to Comments From:

Colorado State Forest Service
Department of Natural Resources
Denver, Colorado 80216

Paragraph #	Response
1	As indicated in Chapter I(D), the Bureau will prepare site-specific environmental impact statements covering each of the 13 sustained yield units in western Oregon and for the timber management programs in the Couer d'Alene District, Idaho and the Ukiah District, California. Additionally, the Bureau will maintain its policy of requiring environmental analysis records for each timber management activity (i.e., timber sale, reforestation project, thinning contract, etc.) that could significantly affect the human environment.
2	Timber productivity classification, as you suggest, is an integral part of the Bureau's land-use planning system described in Chapter I(C). It is a prerequisite to good land-use planning and for maintaining the concepts of multiple use and sustained yield. Suffice to say, all old-growth forests (See appropriate tables and figures in Chapter I,A) including those on submarginal, marginal, and certain highly productive lands will not be subjected to timber management activities.
3	The discussion in Alternative D (formerly C) of Chapter VIII describes the potential impact which could occur under a total partial cut harvesting system. Based on our analysis, it is our opinion that an all partial cut system would not require any more roads than the proposed action. Roading of the lands available for timber production, however, would occur over a much shorter time frame under the all partial cut alternative.

Colorado State Forest Service
(Continued)

Paragraph #	Response
4	The planning process you suggest is described in Chapter I(C) as previously indicated. Environmentally fragile areas are of special concern in the Bureau's Planning System. Further, the planning process permits and requires coordination with state, regional, and local land-use plans as well as those of other federal land-managing agencies. Public input into the Bureau's Planning Process is a requisite at all stages and levels of planning.
5	We believe, the environmental impact statement has been responsive in meeting the primary objective of providing a basic foundation and framework for the environmental impact statements specified in paragraph 1 above. We further believe that the statement has substantially addressed all seven items (objectives) in your letter, with the exception of item number 1. In this case, we do not believe that inventory processes should be thoroughly described in the environmental impact statement as this is a basic component of land-use planning - a requisite process and decisionmaking instrument which must precede a resource (i.e., timber) management program. Further, with respect to item number seven, it is not the Bureau's policy to include economic analyses discussions in an environmental document.

STATE OF IDAHO
Cecil D. Andrus, governor
department of health and welfare
STATEHOUSE, BOISE, 83720
James A. Bax, director

DIVISION OF ENVIRONMENT
May 2, 1975

Curtis J. Berklund, Director
U. S. Department of Interior
Bureau of Land Management
18th & C Streets, N.W.
Washington, D. C. 20240

RE: Timber Management; Draft Environmental Statement; IDHW Comments Concerning

Dear Mr. Berklund:

1- This Division has reviewed the Draft Environmental Statement entitled "Timber Management" and recognize the time and energy expended to prepare this document. However, because of the wide geographical area covered, the nature of the subject matter, it is felt that individual impact statements for each state should be prepared. The location of a road and clear-cutting an area can cause a severe environmental impact.

2- The statement did not cover specific state laws with which the BLM will comply. For instance, in Idaho, the Water Quality Standards require that Departmental approval must be obtained prior to initiation of a project that will create short-term violations of water quality standards. Such projects as road and bridge construction, by their very nature, can violate water quality standards.

3- The exact meaning of "short-term effects" is unclear. In the forest industry, short-term may be five to ten years because of the length of time a forest is managed; however, this would probably be considered a long-term effect by this Department.

4- For these reasons and others, it is suggested that environmental impact statements be prepared on a state-by-state basis rather than a regional basis. The conditions in the other states would not necessarily be the same as those for Idaho.

If you have any questions, please feel free to contact this office.

Sincerely,

DEPARTMENT OF HEALTH AND WELFARE

Lee W. Stokes, Ph.D., Administrator
Division of Environment

LWS/LLK/sj
cc: State Clearinghouse
EPA, Idaho Operations Office

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Idaho Department of Health and Welfare
Division of Environment
Boise, Idaho 83720

Paragraph #	Response
1	Since releasing the draft environmental impact statement, the Bureau of Land Management has determined that it will be necessary, as indicated in Chapter I, to prepare environmental impact statements on each of the sustained yield units in western Oregon. These statements will encompass over 52% of the Bureau lands available for timber production and 92% of the volume harvested annually. The Bureau will also prepare environmental impact statements for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California. Additionally, the Bureau will maintain its policy of requiring environmental assessments and, where determined necessary, environmental impact statements on site-specific projects, i.e., timber sales, reforestation projects, thinning contracts, etc.
2	Individual, state water quality standards were not covered since these will vary from state-to-state. The final environmental impact statement indicates, however, that state water quality standards will be met.
3	Short-term use versus long-term productivity is discussed in Chapter VI of the final environmental impact statement. As a reference point, short-term is defined in the statement as up to 100 years in order to equate timber management with the approximate rotational period of tree harvest.
4	See paragraph 1 above.

MONTANA DEPARTMENT OF NATURAL
RESOURCES AND CONSERVATION
THOMAS L. JUDGE, GOVERNOR
GARY WICKS, DIRECTOR

MEMBERS OF THE BOARD
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CECIL WEEDING
DAVID G. DRUM

449-3712
32 SOUTH EWING
NATURAL RESOURCES BUILDING
HELENA, MONTANA 59601

May 21,1975

Director (340)
Department of the Interior
Bureau of Land Management
18th & C. Streets, N.W.
Washington, D.C. 20240

Dear Sir:

This Department has completed the review of your Draft Environmental Impact Statement for the National Timber Management Program. Following are our comments as prepared by our Division of Forestry.

First, we feel that the BLM has done an outstanding job of analyzing the environmental impacts which can be expected to result from the implementation of this program considering the inherent difficulty in describing a timber management program for a highly variable and large geographical area for a program to be implemented during the next 10 years.

Secondly, we believe that in addition to complying with Section 102(2)(c) of the National Environmental Policy Act, the BLM has produced a very useful framework document which will facilitate both public understanding of the BLM's timber management program and assist the agency in the day to day implementation of NEPA in the design, implementation, and analysis of specific timber management actions.

1- Finally, the only negative comment that we have has to do with the actual production of the report which unfortunately included numerous printing and typographical errors which distracted from an otherwise excellent job of report organization.

We regret we were unable to provide our comments by your May 7 deadline although we are hopeful they are yet useful. Thank you for affording us the opportunity to comment upon this Draft Environmental Impact Statement.

Sincerely,

Gerhard M. Knudsen
GERHARD M. KNUDSEN
ENVIRONMENTAL COORDINATOR

GMK:bjt
cc: Andy Lukes

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Montana Department of Natural Resources
and Conservation
Helena, Montana 59601

Paragraph #	Response
1	The text has been corrected.

Department of Health and Environmental Sciences
STATE OF MONTANA HELENA, MONTANA 59601

John S. Anderson M.D.
DIRECTOR

May 5, 1975

U.S. Department of the Interior
Bureau of Land Management
Washington, D.C.

Dear Sir:

We have reviewed the impact statement on timber management by the Bureau of Land Management and have the following comments:

1- II-30 There appears to be no mention of present ambient air quality in the area under discussion. Pollutant levels in some of the air quality control regions are presently exceeding federal ambient air quality standards. Apparently there has been no check to determine whether the proposed actions will further degrade the air in areas where there is already an air pollution problem.

2- There also is no mention of the federal non-degradation regulations and how the proposed actions will interact with the intent of these regulations.

3- III-15 The magnitude of the impact from slash burning on air quality will be major in some areas.

4- III-48 & 86 Data relating the emissions from slash burning to human health are scarce. However, the lack of data cannot be used as proof that such related problems do not exist.

5- The burning of slash materials emits tremendous amounts of particulates into the air each year. In fact, the largest sources of man-made particulate in Montana are slash burning and road dust. Asthma, emphysema, and bronchitis are respiratory diseases which are aggravated by particulates. A recent study by the Montana Department of Health and Environmental Sciences shows that the Montana death rate for asthma, emphysema and bronchitis is 52% higher than the national average. While the cause of these extremely high death rates cannot definitely be attributed to any specific source the possible relation to slash burning emissions cannot be ignored.

6- In light of the death study findings it is quite possible that air quality standards relating to slash burning and regulations to enforce the standards will have to be tightened up.

III-52 & V-7 The emission of large amounts of road dust in arid
areas may aggravate the respiratory problems of local inhabitants;
7- especially in areas of naturally poor ventilation. It is unfortunate
that the BLM does not recognize this possible aspect of the dust
problem in the impact statement.

III-4 The smoke from slash burning will at times constitute a major
nuisance to local inhabitants during the fall, especially to those
residents with respiratory disorders. It is unfortunate that the BLM
intends to burn the majority of its slash during the fall when meteorological
8- conditions are the worst. More spring burning might help alleviate smoke
related inversion problems as spring normally has fast moving cold fronts
that bring unstable air over the northwest causing dispersion. During
September and October there often are air stagnation problems caused
mainly by slow-moving stable high pressure systems, resulting in low
level inversions and poor transport winds.

V-6 While the occurrance of smoke over population centers may be
9- temporary, the effects on residents with lung disorders may be severe,
especially if the residents lung disorders are already being stressed by
other pollutant sources.

VII-5 The possible added stress that road dust and slash burning
emission may cause residents with lung disorders an irreversible and
10- irretrievable loss of human resources. All possible precautions should
be taken to reduce to a minimum road dust and slash burning that might
cause increases in morbidity and mortality.

In Executive Order 11752 the President stated "It is the purpose of
this order to assure that the federal government in the design, construction,
11- management, operation, and maintenance of its facilities, shall provide
leadership in the nation-wide effort to protect and enhance the quality
of our air. . ."

In the final impact statement the BLM should list what efforts in
12- leadership it is taking to enhance and protect the quality of the air;
specifically in the areas of road dust and slash burning emissions.

Further, the BLM philosophy in regard to pesticide use appears sound. No serious criticism can be forwarded in regard to the pesticide use foreseen in this statement.

The draft statement seems to summarize quite well the wide variety of management activities which can and will effect water quality. It says that state water quality standards will be met in the course of carrying out any timber management practice.

While these activities are bound to result in an effect on water quality, the precautions and controls which are proposed should minimize any adverse effect, if carried out. It is relatively easy to lay out a control program on paper but far more difficult to carry out that same plan in the actual situation.

I see no serious deficiencies relating to water quality in this draft.

Sincerely,

Daniel Vichorek

Daniel Vichorek
Technical Writer
Environmental Sciences Division

DV:dg

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

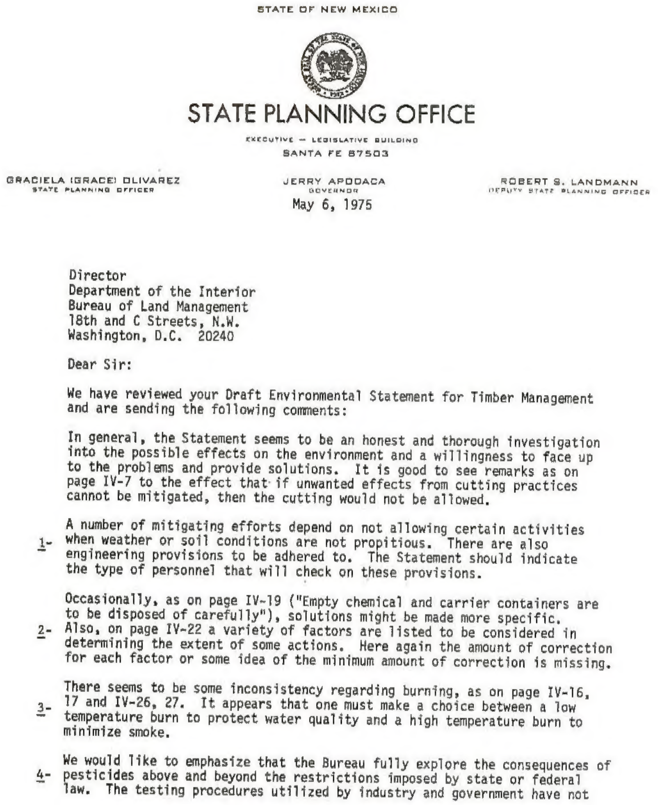
State of Montana
Department of Health and Environmental Sciences
Helena, Montana 59601

Paragraph #	Response
1 and 2	As indicated in Chapter I(D), the Bureau will prepare environmental impact statements covering each of the sustained-yield units in western Oregon. Additionally, the Bureau will require site-specific environmental assessments on each timber management activity which could significantly affect the human environment. These activities include, among others, timber sales, reforestation projects, and thinning contracts. One of the several purposes of these environmental impact statements and environmental analyses will be to discuss ambient air quality for a specific area and to identify and describe the impacts on air quality caused by timber management activities. Specific mitigative prescriptions will also be written to insure that air quality standards will be maintained within acceptable limits as specified by appropriate laws and regulations.

Paragraph #	
3, 4, 5, 6, 8, 9, 10, 11, and 12	Air quality is of great concern to the Bureau. The impact of smoke from fire will depend on how managers plan and use fire in managing resources and residues. The development of interagency smoke management plans will enhance air quality and reduce problems for persons in smoke sensitive areas. Information that we have reviewed supports our conclusion on smoke and air quality and to define the air quality for a specific area is not within the scope of this statement. Research on forest smoke emissions is being conducted by the U.S. Forest Service and, as information becomes available, standards and procedures will change.

State of Montana
Department of Health and Environmental Sciences
(Continued)

Paragraph #	Response
	The practice of burning slash in the fall has grown over the years based on a concern for safety and control of fire with a minimum damage to resources. Spring and summer burning can create problems for control of the fire and may result in fire damage to resources. There is no formal written policy on residue reduction and managers are given the responsibility to develop plans to meet current standards for the resources involved. There are many factors to consider in planning a prescribed burn and, therefore, burning must be evaluated on an individual project basis. Air quality will certainly be a resource that will be given consideration.
7	Chapter III(I)(1)(a) has been revised to reflect this comment. Chapter V which describes residual impacts, in our opinion, accurately states the severity of anticipated effect on human health and safety.



STATE OF NEW MEXICO

STATE PLANNING OFFICE

EXECUTIVE — LEGISLATIVE BUILDING
SANTA FE 87503

GRACIELA (GRACE) OLIVAREZ
STATE PLANNING OFFICER

JERRY APODACA
GOVERNOR

ROBERT S. LANDMANN
DEPUTY STATE PLANNING OFFICER

May 6, 1975

Director
Department of the Interior
Bureau of Land Management
18th and C Streets, N.W.
Washington, D.C. 20240

Dear Sir:

We have reviewed your Draft Environmental Statement for Timber Management and are sending the following comments:

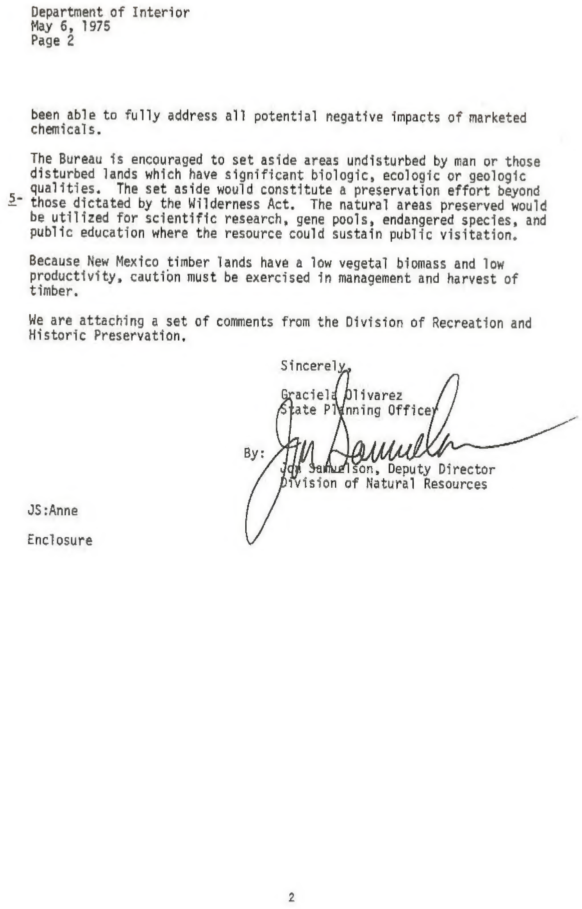
In general, the Statement seems to be an honest and thorough investigation into the possible effects on the environment and a willingness to face up to the problems and provide solutions. It is good to see remarks as on page IV-7 to the effect that if unwanted effects from cutting practices cannot be mitigated, then the cutting would not be allowed.

1- A number of mitigating efforts depend on not allowing certain activities when weather or soil conditions are not propitious. There are also engineering provisions to be adhered to. The Statement should indicate the type of personnel that will check on these provisions.

2- Occasionally, as on page IV-19 ("Empty chemical and carrier containers are to be disposed of carefully"), solutions might be made more specific. Also, on page IV-22 a variety of factors are listed to be considered in determining the extent of some actions. Here again the amount of correction for each factor or some idea of the minimum amount of correction is missing.

3- There seems to be some inconsistency regarding burning, as on page IV-16, 17 and IV-26, 27. It appears that one must make a choice between a low temperature burn to protect water quality and a high temperature burn to minimize smoke.

4- We would like to emphasize that the Bureau fully explore the consequences of pesticides above and beyond the restrictions imposed by state or federal law. The testing procedures utilized by industry and government have not been able to fully address all potential negative impacts of marketed chemicals.



5- The Bureau is encouraged to set aside areas undisturbed by man or those disturbed lands which have significant biologic, ecologic or geologic qualities. The set aside would constitute a preservation effort beyond those dictated by the Wilderness Act. The natural areas preserved would be utilized for scientific research, gene pools, endangered species, and public education where the resource could sustain public visitation.

Because New Mexico timber lands have a low vegetal biomass and low productivity, caution must be exercised in management and harvest of timber.

We are attaching a set of comments from the Division of Recreation and Historic Preservation.

Sincerely,

Graciela Olivarez
State Planning Office

By: Jon Samuelson

Jon Samuelson, Deputy Director
Division of Natural Resources

JS:Anne

Enclosure

2

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of New Mexico
State Planning Office, Division of Natural Resources
Santa Fe, New Mexico 87503

Paragraph #	Response
1	Chapter I(E) of the final environmental impact statement indicates that qualified Bureau personnel will inspect timber sales activity to insure compliance with the terms and conditions of the contract.
2	Chapter IV(D) has been revised to reflect your comment concerning disposal of chemical containers.
3	There are many factors to consider in writing a prescription for burning of wood residues. Soil, water, air, and aesthetics are a few and in writing a prescription, all of them will be given consideration in meeting their standard of protection. In some cases, the degree of protection will not be an easy choice, but field conditions do provide a variety of situations under which the management goals can be reached within the standards of each resource.
4	The Bureau is continually maintaining an awareness of the effects of pesticides on the environment.
5	Areas having unique, scientific, study, wilderness, recreation or other values are identified and analyzed in the Bureau Planning Process as described in Chapter I(C) of the final environmental impact statement.

STATE OF NEW MEXICO

STATE PLANNING OFFICE

EXECUTIVE – LEGISLATIVE BUILDING
SANTA FE 87503

GRACIELA (GRACE) OLIVAREZ
STATE PLANNING OFFICER

JERRY APODACA
GOVERNOR

ROBERT S. LANDMANN
DEPUTY STATE PLANNING OFFICER

May 1, 1975

MEMORANDUM

H-35

TO: Jon Samuelson, Deputy Director
Division of Natural Resources

VIA: Bill Kreuch, Director BK
Recreation and Historic Preservation

FROM: Daniel E. Reiley, Planner II
Recreation and Historic Preservation

SUBJECT: BLM Timber Management, Draft Environmental Statement

A review of the Draft Environmental Statement for the Bureau of Land Management Timber Management reveals that the Bureau has a general knowledge of cultural resource management procedures. The Statement indicates that the Bureau will apply these procedures and follow various federal regulations and guidelines relating to the protection and preservation of cultural resources when conducting timber management activities.

However, the Environmental Statement makes no mention of the nature or extent of the cultural resources found in the South-
1- west and particularly in New Mexico. Even though timber harvesting and related activities in New Mexico are relatively minor, the resulting damage or destruction of cultural resources could be extensive.

The Statement should directly address the problems of cultural resource management in the Southwest as it has done for the
2- more productive areas of the country to be considered an adequate assessment of the impact of the proposed management activities.

It should also be pointed out that the contract for the sale
3- of timber (Appendix B) contains no provisions which would require the contractor to protect cultural resources from damage or destruction resulting from harvesting activities.

DER:dm

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of New Mexico
Recreation and Historic Preservation
Santa Fe, New Mexico 87503

Paragraph #	Response
1, 2, and 3	Identification and evaluation of each cultural resource is beyond the scope and depth of the programmatic environmental impact statement. Chapter IV(J) has been revised, however, to indicate the procedures the Bureau will employ to mitigate potential impacts to cultural resources. Included is the provision that all contracts will carry stipulations to prevent the inadvertent destruction or alteration of cultural resources encountered during project operations.

STATE OF NEW MEXICO

STATE PLANNING OFFICE

EXECUTIVE – LEGISLATIVE BUILDING
SANTA FE 87503

GRACIELA (GRACE) OLIVAREZ
STATE PLANNING OFFICER

JERRY APODACA
GOVERNOR

ROBERT S. LANDMANN
DEPUTY STATE PLANNING OFFICER

May 7, 1975

Director
Department of the Interior
Bureau of Land Management
18th and C Streets, N.W.
Washington, D.C. 20240

Dear Sir:

Enclosed are several additional comments on the Draft Environmental Statement, Timber Management.

These comments are from the Environmental Improvement Agency and the Department of Game and Fish.

Sincerely,

Graciela Olivarez
State Planning Officer

By: Jon Samuelson
Jon Samuelson, Deputy Director
Division of Natural Resources

JS:Anne

Enclosures

HEALTH SAFETY WELLBEING COMFORT

STATE OF NEW MEXICO

Environmental
Improvement
Agency

P.O. Box 2348 - Room 215
Santa Fe, New Mexico 87503

May 5, 1975

Mr. Jon Samuelson
State Planning Office
117 Jefferson
Santa Fe, New Mexico 87503

Dear Mr. Samuelson:

The Environmental Improvement Agency has reviewed the Draft Environmental Statement for Timber Management on BLM lands.

We recognize the difficulty in preparing a single statement for all lands in the Western United States due to variation in climatic conditions and other environmental factors. It is equally difficult to review such a general environmental statement.

The decision to move toward more intensive management involves a shift in emphasis within the multiple use concept. This shift is understandable in view of increasing demands for more timber products. The net result is expected to be a use of more pesticides, fertilizer, fire retardants and logging roads. An increase in water pollution from these silvicultural activities is a certainty.

Page III-15 very generally quanitifies the magnitude of the impact upon various environmental components. Then one must go all the way to Page VIII-10 to
1- determine the contra analysis for a non intensive timber management plan. The implication that the socio-economic impact from intense silviculture will be of "major favorable effect" is to be expected from those who are forestry development proponents. It is submitted that this analysis is subjective and misleading unless similiar economic quantification analysis is given to all other environmental factors.

The letter and spirit of the Environmental Quality Act requires an active search for alternatives. This statement relies too heavily upon justifying present practices rather than looking at new ones. For example: Open burning of slash
2- and logging wastes is not necessary (except in rare situations), with good forestry management. Proper, modern forest management can and should include a "no burning" policy. The statement referring to reduction of burning when utilization of tree parts increases, is not progressive. We cite the U.S. Navy Report "which

demonstrates in an 8 year study that it is technically practical to establish new timber stands without burning.[1] Burning is more destructive to the environment than mere introduction of combustion products to the air. It also reduces organic nitrogen in the soil and provides a means for other nutrients to be leached away by erosion.

Some erosion and stream sedimentation is inevitable with burning practices.
3- Burning usually must be followed by the application of fertilizers to restore
soil fertility. Some of these fertilizers eventually enter watersheds and
impact upon water quality.

Prescribed burning is a practice more consistent with "old traditional" tree
farming or intensive forestry management, rather than a multiple use concept.
To allow prescribed burning as standard practice, rather than limiting it to
very special cases, may be a failure in leadership by a Federal Agency to imple-
ment new methods as well as being a violation of the multiple use concept and
a misconstruction of the planning and mitigating provisions in the Environmental
4- Quality Act. If the practice of burning is permitted, the final draft should
include a description of the need for such practice and a bibliography of the
literature showing benefits which may accrue. We would also request that the
EPA publication, (EPA 430/9-73-010, while quoted on Page III-3, and identified
to make a philosophical point) be included in the bibliography of that section.
The important clause in that quotation is "--- from a forest dedicated to timber
production ---" Pollution from such a forest includes fertilizers and pesticides
as that document points out.

We believe that the use of baiting chemicals, treated seeds, animal repellents
and herbicides unnecessarily threatens water supplies. Baiting should be limited
to Warfarin or other rodenticides used within buildings or structures. Page III-
36 states: "Knowledge is lacking regarding the long range effects of these sub-
stances on our water resources." To use these materials on BLM lands may be
completely consistent with tree farming but may not be consistent with other
5- legislation designed to protect the environment, recreational use and wildlife.
For this reason, the use of such chemicals may not be consistent with the
multiple use concept. We believe the draft should be modified to forbid the
use of chemical pesticides when an alternative option exists. For example,
on Page IV-18, paragraph 2, line 7; "Chemical pesticides should not ---",
should be changed to shall "not be used when non-chemical or intergrated
chemicals and non-chemical techniques offer an alternative option".

The final draft should also include a consideration of the impact which these
6- policies will have upon the Federal Safe Water Drinking Act. Failure to include
such policy considerations is a major defect of this draft.

The draft should also include provisions for balancing timber production require-
ments so as to continue cooperation and coordination with local governments; to
7- set aside lands for recreational purposes, sanitary landfills, and proprietary
functions of local government including energy development.

8- Finally, the multiple use concept must be preserved in utilizing public lands
for the highest and best use of the American people. If the nations energy

problem is used as partial justification for increased timber production then uses of lands for geothermal energy development should be given strong consideration over tree farming.

We appreciate the opportunity to comment. Please request 12 copies of the final draft for use by EIA staff.

Yours truly,

Dick Burgard

Dick Burgard
Environmental Program Manager

DB/ps

---

[1] EPA 430/9-73-010, Processes, Procedures and Methods to Central Pollution Resulting from Silvicultural Activities, October, 1973

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of New Mexico
Environmental Improvement Agency
Santa Fe, New Mexico 87503

Paragraph #	Response
1	The summary tabulation, Table VIII-1, (formerly III-1) has been revised to provide a ready comparison of the proposed timber management program with other alternatives as you suggest. Our analysis of the socio-economic impact, in our opinion, remains as major-favorable.
2, 3, and 4	The study you cite was conducted "on level land and on slopes up to 25%." Such a practice on steeper ground would be impractical and highly destructive. Further, fire is a tool for management of the forest and its use must be based on an evaluation of all the resources in the forest at that particular time and place. Fire may or may not be used because of different environmental conditions and/or land use objectives and policy. The manager will consider burning as one of many alternative methods when formulating plans for residue reduction, and each alternative will be judged based on the impacts it makes on the total environment.
	The draft statement, page I-30 (Forest Development), states that all of the practices or methods are alternatives which may or may not be carried out because of varying conditions. As we learn more about residue management, our practices and policies will be developed and refined. We suggest that you obtain a compendium titled "Environmental Effects of Forest Residues Management in the Pacific Northwest," Technical Report Pacific Northwest Forest and Range Experiment Station - 24, 1974, Owen P. Cramer, Organizer and Technical Editor.
5	This paragraph has been revised to reflect your comment.
6	The preface to Chapter IV has been revised to indicate that necessary mitigating measures will be employed to meet the requirements of the Federal Safe Water Drinking Act.

State of New Mexico
Environmental Improvement Agency
(Continued)

Paragraph #	Response
7 and 8	Coordination and cooperation with local governments in land use planning, as you suggest, is a function of the Bureau Planning System which is described in Chapter I(C). This planning process is a prerequisite to implementing on-the-ground actions to insure that all resources, including those uses you mention, are used wisely and, to the extent practical, in harmony with each other.

State of New Mexico

TMENT OF GAME AND FISH
STATE CAPITOL
SANTA FE
87503

May 2, 1975

Mr. Jon Samuelson
Natural Resources Division
State Planning Office
Executive Legislative Building
Santa Fe, New Mexico 87503

Dear Mr. Samuelson:

Objectives, policies and procedures followed in the development of the timber management program in conjunction with development of Management Framework Plans, are adequate for the overall plan. The subsequent preparation of environmental analyses or statements for timber management programs on a state, district or local forest basis will provide the opportunity for state game and fish agencies to provide input for the protection or enhancement of wildlife interests.

Thank you for the opportunity to review and comment upon the statement.

Very truly yours,

Phil E. Freeman
Phil E. Freeman
Wildlife Environmentalist

AN EQUAL OPPORTUNITY EMPLOYER

EXECUTIVE DEPARTMENT

INTERGOVERNMENTAL RELATIONS DIVISION
~~LOCAL GOVERNMENT RELATIONS DIVISION~~

240 COTTAGE STREET S.E. • • • • SALEM, OREGON 97310

ROBERT W. STRAUB
GOVERNOR

STAFFORD HANSELL
Director

May 12, 1975

Director (340)
Department of the Interior
Bureau of Land Management
18th & C Streets, N. W.
Washington, D. C. 20240

Dear Sir:

Re: Timber Management
PNRS #7504 4 180

Thank you for submitting your draft Environmental Impact Statement for State of Oregon review and comment.

Your draft was referred to the appropriate state agencies. The State Agriculture Department, State Health Division, Department of Environmental Quality and State Wildlife Commission offered the attached comments which should be addressed in the preparation of your final Environmental Impact Statement.

We will expect to receive copies of the final statement as required by Council of Environmental Qualify Guidelines.

Sincerely,

William H. Young
William H. Young
Administrator

WHY:lm

Attachments

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Local Government Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

LOCAL GOVERNMENT RELATIONS DIV
MAY 8 1975

D
APR 14 1975
Agricultural Development Div.

PNRS STATE REVIEW

Project #: 7504 4 180

Return Date: MAY 1 1975

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

( ) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

We support the Bureau of Land Management, Timber Management PNRS 7504-4-180.

1- The management and harvesting of our timber resources should reflect both the economic and environmental need of our area.

2- Growing timber a renewable resource should be managed in a method to achieve the highest and best use of this resource.

3- While many standard practices for timber harvest and management are well established we should continue study new and improved methods, mainly, slopes compatible for clear cut, and select logging methods in an area where road building is restricted.

4- However, we should continue to strive for the maximum use of our timber resources.

Agency Agriculture

By Don McKinnis DMcK

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Oregon
State Agriculture Department
Salem, Oregon 97310

Paragraph #	Response
1, 2, 3, and 4	The Bureau will continue to manage its commercial forest lands in a manner that will provide economic stability while at the same time protecting and enhancing the environment. As study and research provide new and improved methods for timber harvest and management, these practices will be evaluated and, when appropriate, employed to provide optimum use and protection for all natural resources.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Local Government Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

LOCAL GOVERNMENT RELATIONS DIV
MAY 8 1975

P N R S   S T A T E   R E V I E W

Project #: 7504 A 180   Return Date: MAY 1 1975

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

(✓) The environmental impact is adequately described.

( ) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

From The standpoint of water Supply

1. Continued research in forests for augmention of water supply by vegetative manipulation in the upper Timber zone is to be encouraged.
2. Where vegetative manipulation has resulted in increased yield and provided other benefits, such program should be implemented to the extent possible

Agency Water Resources   By Quentin Bowman

OREGON WILDLIFE COMMISSION

staff comments on

Bureau of Land Management

Draft Environmental Statement

on

TIMBER MANAGEMENT

April 25, 1975

Wildlife Commission staff comments on the draft environmental statement, are twofold in purpose: (1) to strengthen the mitigative measures in regards to fish and wildlife habitat and water quality; and (2) to summarize the mitigative measures that apply to areas of responsibility of the Oregon Wildlife Commission.

Whereas, Section IV on mitigative measures provides considerable protection for fish and wildlife habitat, some additions are needed. These are listed in Part I of the comments.

A- Even though the statement is in draft form only, the comment is made (page I-5) that the current program has been active since 1971. Because of this, it is assumed that the mitigative measures have also been available during this time and can presently be used on BLM lands. The summary (Part II of the comments) has been circulated to all Commission biologists. The biologists have been encouraged to utilize the measures when providing input on proposed timber sales on BLM lands or inspecting on-the-ground operations.

B- The summary is included as a portion of the Wildlife Commission comments to seek the determination if all measures listed apply to the Northwest Coastal and Montane Sub-Biomes in Oregon.

PART I

General Comments

1. Because of unstable soils, tractor logging has caused problems on slopes of 35 percent of less, especially in southwestern Oregon. In Section IV, however, tractor logging is permitted on slopes up to 45 percent.

2. Roads constructed through meadows, marshes, bog and other sites have adverse impacts on critical wildlife habitat. This factor should be covered in detail.

3. Culvert size and gradient are critical to fish passage as well as to the prevention of road failures. Culvert placement is covered to some extent in Section IV, but additional protection is needed. In cases where fish passage problems may arise, open-arch culverts or bridges should be used. In situations where round culverts are utilized in fish-bearing streams, installation gradient should be near zero percent. All stream crossings should be constructed, as a minimum, to handle flows during the 25-year frequency storm.

4. Page IV-13: "activity in the streambed is to be kept to a minimum and performed during low water periods."

   Comment: Low water periods may not be the most appropriate time to operate in streams. Fish eggs may be in the gravel or young fish rearing in the stream. All stream activity should be closely coordinated with local biologists.

5. Page IV-14: Concerning maintenance of culverts

   Comment: An area of at least 50 feet above culvert entrances should be cleaned to remove debris that could plug the culvert during the rainy season.

6. Page IV-32: Aquatic vegetation

   Comment: This section deals primarily with live streams or lakes. No mention is made of protecting bogs, marshes, wet meadows or other water sources. Protection of these sites is critical for maintenance of streamflows in certain areas such as southwestern and eastern Oregon.

7. Page IV-42: Domestic livestock

   Comment: More consideration is given to providing needs of livestock than for terrestrial wildlife. The amount of land taken out of production due to construction of roads, trails and lands is to be minimized for livestock, not so for wildlife. Rehabilitation and revegetation measures will be undertaken by seeding livestock forage on disturbed areas, included roads and trails. Equal consideration is not given to wildlife. Chemical weed control programs will be designed to only effect plants of little importance to livestock. Conversely, chemical programs will be designed to intentionally eliminate wildlife forage.

PART II

Procedures to minimize impacts of timber management operations on fish and wildlife habitat, Bureau of Land Management.

Road Construction

1. avoid mid-slope road construction and intersection of drainages;
2. revegetate critical cut slopes and fills when construction activity is terminated;
3. during earthwork operations, such devices as silt basins, sedimentation ponds, berms, temporary down drains, brush barriers and other techniques will be used to minimize storm runoff and control sedimentation;
4. erodible soil will be stabilized by seeding, mulching, slope dressing, fertilizing, lining or other techniques;
5. ditch and flume liners of sod, rock, rubble, portland concrete, asphalt concrete, plastic or other materials will be used for immediate erosion control on ditch bottoms, shoulder slopes, fill slopes at culvert ends, bridge abutment slopes and other areas subject to erosion;
6. erosion in ditches will be controlled by providing a series of dams or weirs across the ditch to reduce flow velocity. Such checks will be constructed of concrete, stone, riprap, timber, steel or earth;
7. energy dissipators or stilling basins are to be used at culvert outlets which pose an erosion problem;
8. activity in the streambed is to be kept at a minimum and performed during low water periods;
9. roads will be designed to minimum dimensions consistent with traffic safety;
10. riprap, extra drainage and other measures will be used on roads across unstable terrain;
11. stream channels will never be used as disposal sites for excavated material;
12. stream channels and banks will be protected by leaving buffer strips wherever possible;
13. excavated material will be endhauled when necessary to avoid long sidecast fills in steep terrain;

14. drainage from culverts will never be allowed to fall on unprotected fills; aprons are to be installed on fills under culvert outfalls.

15. temporary roads and trails will be waterbarred at the time of their abandonment;

16. roads will be located away from aquatic habitat or areas of unstable soils and will be engineered to prevent side-casting;

17. all unsurfaced roads will be waterbarred;

18. roads will either avoid big game winter range or roads will be closed during winter or other critical need seasons;

19. spur roads will be closed when not necessary for timber management;

20. vegetative cover screens will be left along main roads through cutting areas;

21. cutbanks along steep sideslopes will be designed to allow unrestricted animal movement up and down slope;

22. road gravel will not be obtained from streams;

23. channel changes will not be made for road construction;

24. culverts and other structures will be installed that will permit fish passage;

25. rock crushing and washing sites will be located away from streams;

26. road surfacing material will be used that will not erode during wet weather;

27. no construction work will be done during periods of heavy rainfall;

28. soil and debris from landslides will be endhauled to locations where erosion into streams will not occur.

Road Maintenance

1. culvert inlets will be cleared before and kept clean during rainy season;

2. spur roads that outslope will be cross drained;

3. gully erosion in waterways and ditch bottoms will be repaired by filling, shaping and lininig with riprap, juted or sodded materials;

4. debris and slide material will be endhauled and deposited above the high water level;

5. disturbed areas will be stabilized with deep-rooted legumes and grasses, fertilized and mulched or through other appropriate practices.

Timber Removal

1. tractor logging will be restricted to slopes less than 45 percent;

2. skidding operations will be limited to the time of year when the soil is relatively dry and stable;

3. tractor logging will not be permitted down or across any stream channel;

4. skid roads will not be constructed for removal of only one or two trees;

5. following completion of tractor logging, skid roads will be waterbarred.

6. cull logs will not be decked at the edge of landings.

7. all perennial streams and those streams which carry water during peak runoff seasons will have streamside buffer strips;

8. buffer strips along streams will contain enough trees and shrubs to provide shade for the stream and protection for the streambank;

9. stream channels will be cleared concurrent with logging; channel clearance will not be deferred until a later date;

10. trees will be felled in such a manner so as to prevent them from entering stream channels;

11. size of clearcut units will be restricted to 40 acres or less;

12. if logs are to be yarded across important perennial or intermittent streams, logging systems will be used that will suspend logs above the streamside buffer strip;

13. areas denuded of vegetation as a result of logging will be seeded to forage species best suited to a variety of wildlife in critical food shortage areas;

14. streams will be protected from mud and siltation by prohibiting yarding during periods of heavy rainfall;

15. any temporary stream crossings will be removed upon completion of logging;

16. falling of snags will be restricted almost solely to fire suppression activities.

Pesticides

1. no pesticide will be used where there is a basis for belief that water quality will be degraded or hazards exist that will unnecessarily threaten fish, wildlife, their food chain or other environmental components;

2. monitoring of streams and bodies of water will be done prior to, during, and as long as necessary after chemical application to assure safe application;

3. an untreated buffer strip will be left between streams and areas treated with chemicals or fertilizer;

4. brush removal will be avoided on big game winter ranges, calving and fawning sites;

5. carcasses of poison-killed animals will be burned or otherwise disposed of to protect carrion-feeding wildlife from effects of secondary poisoning;

6. drift of spray will be minimized by spraying only when air is calm.

Fire Protection and Slash Burning

1. fire lines will be water-barred and revegetated;

2. hydromulch will be applied to provide immediate protection where needed to stabilize the soil;

3. areas burned as a result of backfiring will be revegetated as soon as possible;

4. in slash burning operations, filter strips of undisturbed vegetation will be left along the bottom of the burned area adjacent to streams;

5. the edge of a stream or lake will be used to backstop a backfire only as a last resort.

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Oregon Wildlife Commission
Salem, Oregon 97310

Paragraph #	Response
A and B	Most mitigative measures identified in Chapter IV are currently in use on Bureau-administered lands. With respect to your summary of mitigative measures, we would urge caution in their use as many of these have been modified in the revised text. Further, your summary often takes the mitigative measures out of context and, therefore, provides only general guidelines. Item number 11 under Timber Removal, for example, specifies that "size of clearcut units will be restricted to 40 acres or less." Though this is generally true, situations will arise (i.e., natural catastrophes) which may require larger cutting units.
Part I	
1	Chapter IV has been revised to reflect that tractor logging will be restricted to slopes of 35% or less as a practical maximum. However, where the land consists of pitches and benches or where soil types and geologic conditions permit, tractor logging may be used on steeper slopes.
2	Chapter III has been revised to include this comment.
3	Chapter IV(G, 2) has been revised. Mitigating measures for possible site-specific impacts will be identified and evaluated on a case-by-case basis through the environmental analysis process.
4	Chapter IV has been revised to include this comment.
5	Clearance of areas above culverts is a local management decision. Many culverts are placed where there is little debris or where such maintenance is not necessary. In many circumstances, clearance of "debris" 50 feet above the culvert could result in greater impact than no maintenance, especially in relatively undisturbed areas.
6	Bogs, marshes, wet meadows, and other critical habitat areas, have been added to the discussions on riparian and aquatic vegetation.

Oregon Wildlife Commission
(Continued)

Paragraph #	Response
7	Chapter IV(G, 1) has been revised to reflect these comments.
Part II	As indicated in the environmental impact statement, most of the mitigative measures cited in Chapter IV are used by the Bureau as a standard practice. We point out, however, that in revising the environmental impact statement the language of Chapter IV may have changed from that cited in your comments. We would also point out the risk of taking these mitigating measures out of context. Certain mitigative measures, for example, may not be necessary or appropriate for specific projects. Caution should, therefore, be exercised in applying those items cited (in your comments) to your program.

SOIL AND WATER CONSERVATION
COMMISSION

20 AGRICULTURE BUILDING • SALEM, OREGON • 97310 • Phone 378-3810

Robert W. Straub
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DIRECTOR
BUD F. A. SVALBERG

April 16, 1975

Intergovernment Relations Division
240 Cottage Street S. E.
Salem, Oregon 97310

Gentlemen:

I want to commend the Bureau of Land Management for a comprehensive treatment of TIMBER MANAGEMENT in its draft Environmental Statement.

With one exception, I feel the statement is well done and acceptable.

My one reservation has to do with forest land planning procedures. I call your attention to the Memorandum of Understanding, developed in consultation with the National Association of Conservation Districts, 1- establishing policy and guidelines for use by the BLM, U.S.F.S., and SCS for conducting activities in resource planning and for work with Conservation Districts, State and local agencies, private landowners who are Conservation District Cooperators and others in developing and implementing sound resource management and conservation programs.

It is my feeling that this Memorandum, along with the policy statement, authorities, responsibilities, objectives, special considerations, and State coordination be 2- acknowledged as a part of the "Forest Land Use Planning Procedures". It may be that the entire Memorandum should be shown to include that other agencies, groups, etc., do have a valid and meaningful input to your planning procedures.

Sincerely,

Bud F A Svalberg

Bud F. A. Svalberg
Director

BFAS:sa

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Oregon
Soil and Water Conservation Commission
Salem, Oregon 97310

Paragraph #	Response
1 and 2	Chapter I(C), Forest Land Use Planning Procedures, has been expanded to provide the reader with a more comprehensive discussion of the Bureau's land use planning procedure. Because the planning system is complex, however, we must limit our discussion to a general overview.

FISH
COMMISSION

OFFICE OF THE DIRECTOR

307 STATE OFFICE BLDG. • 1400 S.W. 5th AVE. • PORTLAND, OREGON • 97201

Robert W. Straub
~~TOM McCALL~~
GOVERNOR

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State Fisheries Director

June 13, 1975

Director (340)
U.S. Bureau of Land Management
Washington, D. C. 20240

Dear Sir:

We have examined your draft Timber Management Environmental Statement and the April 25, 1975 comments developed on it by the Oregon Wildlife Commission staff. Since most of our concerns with impact of timber management are identical to those of the Wildlife Commission, we fully concur in their comments on the statement.

Principal concerns with management direction indicated in the draft which cause severe loss to aquatic habitat and fish life stem from extensive road construction and ground yarding of 1- timber. Reduced road mileages and increased use of aerial systems over what is indicated in the statement would be realistic mitigative measures to prevent aquatic resource losses.

As it stands, many of the mitigative measures proposed in Section IV 2- are a "band aid" approach to resolving an onsite problem or problems found with individual timber sales rather than focusing on timber management planning and design to prevent problems from arising.

Sincerely,

Ronald W. Hasselman

RONALD W. HASSELMAN, ASSISTANT
WATER RESOURCES ANALYST

cc Bureau of Land Management, state office
Oregon Wildlife Commission

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Oregon
Fish Commission
Portland, Oregon 97201

Paragraph #	Response
1	Mitigative measures, Chapter IV, recognizes that proper road location, design, alignment, etc., are important means of reducing road construction impact. The final environmental statement also recognizes the importance of aerial logging systems which will be used where situations warrant.
2	Timber management planning and design begins early in the Bureau Planning System and continues through post sale monitoring. This planning program permits identification and resolution of problems prior to their arising or recurring.

FORESTRY DEPARTMENT

OFFICE OF STATE FORESTER

2600 STATE STREET • SALEM, OREGON • 97310 • Phone 378-2560

May 28, 1975

Mr. E. J. Peterson
Acting State Director
U. S. Department of Interior
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Dear Mr. Peterson:

The BLM "Timber Management" draft Environmental Statement fairly appraises the possibilities for impact to the environment from logging and other land management activities. The material covered seems to be the way things are in real life.

The mitigative measures planned to be taken are necessary
and effective. The costs of mitigative measures are not
1- weighed against the benefit to be accrued by the new activity.
The report could be more specific on measuring the results of
an activity in terms of losses other than changes to the
eco-system.

Clearcutting and soil erosion are not synonymous. Logging
systems that swing the material free of the ground and protect
the riparian vegetation can have less of a biological impact
2- than other systems which do not clearcut. It must be remem-
bered that in the natural order of things clearcutting with
fire is what has provided Douglas-fir forests. The statement
mentions the natural establishment of the climax forest only
in passing.

It would seem that a summary of this statement is in order. A
3- person should not have to wade through 500 pages to discover
that timber management does not have intolerable impacts on the
environment, that it enhances some values rather than degrades
them.

In most respects the statement is well done.

Very truly yours,

William P. Holtsclaw / PDB
William P. Holtsclaw
Assistant State Forester

WPH:cm

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Oregon
Forestry Department
Salem, Oregon 97310

Paragraph #	Response
1	Bureau of Land Management guidelines exclude cost-benefit analyses from environmental impact statements. The environmental impact statement is not a decisionmaking document in itself. Rather, it is designed to display the environmental "costs" of a proposal for the decisionmaker. Accordingly, cost-benefit analyses are reserved for inclusion in any subsequent Program Decision Option Documents when such documents are determined necessary.
2	We agree with these views. Clearcutting remains a viable silvicultural practice within the Bureau's timber management program. Clearcutting on Bureau lands, however, will be conducted in accord with the guidelines set forth in the Report By The Federal Subcommittee on Public Lands on Clearcutting on Federal Lands.
3	A brief summary of the environmental impact statement is provided inside the front cover.

Director / Carl N. Crouse
Assistant Directors / Ralph W. Larson
Ronald N. Andrews

Game Commission
Arthur S. Coffin, Yakima, Chairman
James R. Agen, LaConner
Elmer G. Gerken, Quincy
Claude Bekins, Seattle
Glenn Galbraith, Wellpinit
Frank L. Cassidy, Jr., Vancouver

DEPARTMENT OF GAME

600 North Capitol Way / Olympia, Washington 98504

May 5, 1975

Jerry Parker
Office of Program Planning & Fiscal
Management
House Office Building
Olympia, Washington 98504

Attention: Curt Berklund, Director - Bureau of Land Management

Dear Mr. Parker:

Your draft environmental impact statement - Timber Management, U. S. Department of the Interior, Bureau of Land Management - was reviewed by our staff as requested. Comments follow.

This document covers timber management programs for Bureau of Land Management (BLM) lands throughout western United States. Although all the lands under discussion can be classified under the Coniferous Forest Biome. The various ecosystems within the biome range from spruce thickets of central Alaska, through the rain forests of western Washington and Oregon, to the dry pine forests of the Rocky Mountains.

In an effort to at least partially compensate for this diversity of
vegetative types, the authors have divided the Coniferous Forest Biome into
three sub-biomes. These are the Tiaga in central Alaska, the Northwest Coastal,
1- including the southeast coast of Alaska, and the west coast of Washington,
Oregon, and California; and the Montana sub-biome which includes all of the drier
forest sites in the western United States. Most data in the EIS has been broken
down according to these sub-biomes.

Though there was this attempt to break down data into the three sub-biomes,
the major weakness of the statement still lies in the wide diversity of vegetative
types within these sub-biomes, the variety of management systems that are applied
2- to these types, and the different flora and fauna that are involved. This makes
it impossible to do more than talk in generalities about any particular area.
For the report to be meaningful, more data are needed concerning specific areas
and how those areas will be managed.

In addition to this, in reading the statement we get the impression that
despite the size of the report, a major purpose was to placate certain segments
3- of the population. There may be little correlation between statements made
in the report and what actually takes place on the ground, unless greater
assurance of plans for implementation are included.

One example is the rather liberal listing of fish and wildlife species that are classified as "endangered", but in no way does it point out how BLM timber management policies would affect these species, if at all. Nor does it specify how these policies would be modified if they do have an impact. Another example is in Section IV, page 40, where it is stated, in dicsussing
4-logging methods, "To mitigate adverse impacts, the logging method least destructive to soil and terrestrial vegetation; i.e., aerial methods such as: skyline, balloon, or helicopter yarding are to be given first priority." The statement is not qualified in any way; yet anyone familiar with the economics of logging operations knows that it is not practical under present day technology, except in very rare circumstances, to utilize balloon or helicopter yarding. Also, skyline techniques are considerably more expensive than more conventional methods; yet reading the statement, we get the impression that these are the standard techniques that will be used on BLM lands.

One area where blanket generalizations can lead to erroneous conclusions concerns the impact of timber harvest on black-tailed deer. The report points out that opening the forest canopy, allowing sunlight to penetrate to the forest floor, increases shrub growth and thus improves habitats for Roosevelt elk and
5-black-tailed deer. This is essentially correct for western Oregon and Washington, but no distinction is made between these areas and the Sitka black-tailed deer ranges of southeastern Alaska. In Alaska, primarily because of snow depths that accumulate in clear cuts, deer are forced to winter in old growth timber stands. Logging these areas, especially immediately adjacent to the shoreline, can be totally devastating to the deer population.

In discussing the Tiaga Sub-Biome, it is pointed out that most of the area is remote with little economic value except for recreational purposes. About
6-the only management applied on much of this area is fire suppression; but there is no discussion concerning impacts of this technique. Burning is often beneficial to wildlife, particularly moose, and it appears there should be some discussion about impacts of fire suppression activities on recreational and wildlife values.

Several places in the report, statements are made to the effect that logging creates more diverse habitats and that this will result in a wider variety of wildlife species. This is true only to the extent that logging, over a period
7-of years in the same area, will result in different successional stages of vegetative growth. But, particularly, under clear-cut management systems, the tendency is toward establishment of uniform age stands with very little diversity.

Another philosophy that crops up several times in the report is the erroneous conclusion that birds or mammals will simply be displaced when their
8-habitat is destroyed. These animals are in fact eliminated from the population if their habitat is destroyed, although the population may build up again once the habitat is restored.

In discussing species characteristic of the various sub-biomes, no mention
9- is made of wolves, although they are an extremely important component of both the Tiaga and the Northwest Coastal Sub-Biomes in Alaska.

On the other side of the ledger the report does list many practices for
10-logging road construction, buffer zones along streams, culvert installation, reseeding disturbed areas, etc., that if carried out in actual timber management operations, would be highly beneficial to fish and wildlife resources.

Thank you for the opportunity to review your statement. We hope our comments will be helpful.

Sincerely,

THE DEPARTMENT OF GAME
E. S. Dziedzic
Eugene S. Dziedzic, Asst. Chief
Environmental Management Division

ESD:jb
cc: Jack Kirkendall
Morris Thomas
Carl Patzwaldt
Agencies

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Washington
Department of Game
Olympia, Washington 98504

Paragraph #	Response
1 and 2	We believe the final environmental impact statement adequately fulfills one of its primary purposes, to provide a basic framework and foundation for site-specific environmental impacts which will cover each of the 13 sustained-yield units in western Oregon as specified in Chapter I. The Bureau will also prepare environmental impact statements for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California. Additionally, site-specific environmental analysis will be required on individual timber management actions, i.e., timber sale, reforestation project, etc., which significantly affect the human environment.
3	Those mitigating measures identified in Chapter IV of the final environmental impact statement are viable means for reducing adverse impacts. Most of these measures are currently being used by the Bureau's field offices in the administration of the timber management program.
4	Chapter III(G) identifies the unmitigated impacts to animals. Impacts to a specific species on a specific area will be identified and evaluated in the site-specific environmental assessments required for each timber management activity (i.e., timber sale, thinning contract, reforestation project, etc.). Chapter IV(G, 2) has been revised to reflect your comments concerning aerial logging methods.
5	The Bureau has little, if any, timber producing lands in southeast Alaska. We recognize that there are variations to almost every broad resource statement. The specific method of cutting must be determined for the site and restraints placed in the timber sale plan.

State of Washington
Department of Game
(Continued)

Paragraph #	Response
6	The beneficial effects of controlled burning for wildlife are recognized. The current fire management plan for Alaska recognizes the beneficial wildlife values.
7	The need for diverse age groups of vegetation for wildlife has been amplified in the final statement.
8	The text now discusses the elimination of segments of wildlife populations through habitat destruction, and the fact that the adjacent habitat cannot entirely absorb the displaced animals.
9	Wolves have been added to the list of typical animals found in the Taiga and Alaska Coastal Coniferous Forest Biome.
10	See response to paragraph 3 above.

May 5, 1975

State of
Washington
Department
of Ecology

Director (340)
Bureau of Land Management
Washington, D. C. 20240

RE: Draft Environmental Impact Statement DES 75-10 for
Timber Management for Western United States
January 1975.

To the Director:

Your impact statement has been reviewed by Rollie Geppert, Natural Resource Scientist with our Department. He offers the following for your consideration:

"This document is the finest one I have ever seen on assessing the impact of forest practices. It differs from the EIS we are writing in that the causes and effects of forest practices are not dependent on the use of a regulation.

Section IV on mitigative measures contains some good ideas that could be used to make regulations.

In regard to specific comments, I have listed a few concerns and questions that the BLM document may wish to examine in further detail:"

Page	Section	
IV-16	D	The state water quality standards to be met should be listed, possibly in chart form so the reader can see any differences. If there are differences, will the mitigative management practices differ from state to state?

1-

Water Quality Criteria	Ore	Wash	Idaho	Alaska
Turbidity	?	?	?	?
Dissolved Oxygen	?	?	?	?
Temperature	?	?	?	?
Other	?	?	?	?

Daniel J. Evans Governor John A. Biggs Director Olympia Washington 98504 Telephone (206) 753-2800

	Page	Comment
2-	IV-18	Are there any controls on the application practices of fertilizers? Does the second paragraph on page IV-20 mean that all pesticide application laws will apply to fertilizers too? Is this what "strict attention" means?
3-	IV-22 paragraph 1	Is there any technical procedure or calculation required to determine the necessary width of the buffer strip? If the utility of a buffer strip is twofold; reduce sediment-laden overland flow and stream temperature control, is there a difference in the species of vegetation and the width of that vegetation?
4-	IV-54	Does the BLM subscribe to using Federal Research Natural Areas as a mitigative measure to preserve terrestrial, freshwater and marine ecosystems, communities or habitats and race and endandered species? If so, RNA's should be referenced here or in Section VII, Irreversible and Irretrievable Commitments of Resources.

If you have any questions or desire further assistance please contact Mr. Geppert at (206) 753-3892.

Sincerely,
Maureen M Rowe

Maureen Rowe
Community Affairs Assistant
Environmental Review Section

MR:je
CC: Department of Game
Department of Fisheries 2
Department of Natural Resources
Office of Program Planning & Fiscal Management

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

State of Washington
Department of Ecology
Olympia, Washington 98504

Paragraph #	Response
1	State water quality standards are quite different and comparison would show considerable disparity with little relationship to timber activities. Water quality standards, however, will be considered in greater detail in site-specific environmental analysis and environmental impact statements. Since Bureau management practices will vary from state-to-state (depending upon the characteristic environment and existing state laws), it can be expected that mitigative measures will also differ from state-to-state.
2	As indicated in Chapter IV(D), adverse impacts caused by fertilization will be mitigated using the same precautions as used for pesticides.
3	Buffer strip width is dependent upon a number of variables such as stream characteristics, topography, soils, geology, vegetation type (including density and height), and others. Because of these many variables, there is no universal means of calculating buffer strip width. Generally, however, buffer strips from 50 to 200 feet provide sufficient protection to surface waters.
4	The Bureau of Land Management does subscribe to research natural areas and special protective areas as indicated in Chapter I. This is not, however, considered in the context of mitigation as these lands are not a part of the timber production base acreage.

STATE OF WASHINGTON
OFFICE OF THE GOVERNOR
OFFICE OF PROGRAM PLANNING AND FISCAL MANAGEMENT
HOUSE OFFICE BUILDING
OLYMPIA, WASHINGTON 98504

DANIEL J. EVANS
GOVERNOR

LEE M. BUFFINGTON
DIRECTOR
206-753-5450

May 2, 1975

Mr. Curt Berklund, Director
Bureau of Land Management
Department of the Interior
Washington, D.C.

Dear Mr. Berklund:

Review of the draft environmental impact statement for the Timber Management Program has been completed by agencies of the State of Washington. The review process was coordinated by the Office of Program Planning and Fiscal Management, acting in its role as the state clearinghouse.

Comments received from the Department of Fisheries, Department of Highways, Department of Natural Resources and the Parks and Recreation Commission are attached for -our consideration in preparing the final statement.

Thank you for the opportunity to review the statement. I hope you will find these comments useful in preparing the final statement.

Sincerely,

STATE PLANNING DIVISION

Nicholas Lewis

Nicholas D. Lewis
Assistant Director

NDL:dc

Attachment

GOVERNOR
DANIEL J. EVANS
COMMISSIONERS:
JEFF D. DOMASKIN
THOMAS C. GARRETT
KAY GREEN
BEN HAYES
RALPH E. MACKEY
EUSTACE VYNNE
WILFRED R. WOODS
DIRECTOR:
CHARLES H. ODEGAARD

WASHINGTON STATE
PARKS & RECREATION COMMISSION
LOCATION: THURSTON AIRDUSTRIAL CENTER PHONE 753-5755
P. O. BOX 1128 OLYMPIA, WASHINGTON 98504

April 7, 1975

IN REPLY REFER TO:
35-2650-1820

TO: Mike Mills, State Planning Division
Office of Program Planning and Fiscal Management

FROM: David W. Heiser, Chief, Environmental Coordination

David Hansen, Chief of Archaeology and Historic Preservation

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT - DOI - TIMBER MANAGEMENT

The Washington State Parks and Recreation Commission has reviewed the above-noted document and can find no adverse impact on existing or proposed recreational areas under the jurisdiction of the Commission.

1-This statement contains no provision for steps to be taken to mitigate potential identified hazards to archaeological and historical sites.

Thank you for the opportunity to review and comment on this statement.

sg

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Washington State
Parks and Recreation Commission
Olympia, Washington 98504

Paragraph #	Response
1	Chapter IV(J,3) has been revised to reflect this comment.

WASHINGTON STATE
HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
Highway Administration Building
Olympia, Washington 98504 (206) 753-6005

Daniel J. Evans - Governor
G.H. Andrews - Director

April 2, 1975

Mr. Mike Mills
State Planning Division
Office of Program Planning and
Fiscal Management
Olympia, Washington 98504

Bureau of Land Management
Timber Management
Draft Environmental Statement

Dear Mr. Mills:

Reference is made to your letter of March 28, requesting our review of the draft environmental statement for the above project.

We have completed our review with respect to existing or proposed highways in the area and find no conflicts.

Thank you for the opportunity to review this information.

Sincerely,

G. H. ANDREWS
Director of Highways

By: H.R. Goff
H. R. GOFF
Assistant Director for
Planning, Research and State Aid

HRG:eh
RA/RBD

Baker Ferguson, Chairman Walla Walla · A. H. Parker Bremerton · Howard Sorensen Ellensburg · Virginia K. Gunby Seattle · Julia Butler Hansen Cathlamet · H.

STATE OF WASHINGTON
Department of
Natural Resources
OLYMPIA, WASHINGTON
98504

COMMISSIONER
BERT COLE
DON LEE FRASER
SUPERVISOR

April 18, 1975

Mr. Mike Mills, Admin. Assistant
OPP & FM
Olympia, WA 98504

Dear Mr. Mills:

The draft environmental impact statement for the proposed BLM Timber Management Program has been reviewed by the Department of Natural Resources. We have no comments regarding this proposal.

We appreciate having an opportunity to review this statement.

Sincerely,

BERT L. COLE
Commissioner of Public Lands

Bruce W. Reeves
Executive Assistant

BWR:cf

WASHINGTON
Department of
[illegible]

DANIEL J. EVANS
GOVERNOR

ROOM 115, GENERAL ADMINISTRATION BUILDING • PHONE 753-6600
OLYMPIA, WASHINGTON 98504

DONALD W. MOOS
DIRECTOR

April 21, 1975

State of Washington
Office of Program Planning and
Fiscal Management
House Office Building
Olympia, Washington 98504

Attention Mike Mills

Gentlemen:

Draft Environmental Impact Statement
U. S. Department of the Interior
Bureau of Land Management

This is in response to your request to review and comment on the EIS for BLM's 10-year timber management program. The EIS covers BLM activities in the entire western United States and Alaska, with very little land in the State of Washington being under BLM administration.

The document well covers the environmental effects of forest operations, as well as preventive measures which will lessen their impact on fishery and other resources.

Our main comment is that streams would probably receive adequate protection if the protective measures identified are implemented in the ground.

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement.

Sincerely,

Gene Deschamps, Biologist
Stream Improvement & Hydraulics

GD:bj

cc: Department of Game
Department of Ecology
Management & Research

CrownZellerbach

May 12, 1975

Vice President

Director (340)
Department of the Interior
Bureau of Land Management
18th & "C" Streets, N. W.
Washington, D. C. 20240

Dear Sir:

Careful study of the January,1975, draft Environmental Impact Statement of the Bureau of Land Management National Timber Management Program gives rise to much concern about the future of timber harvesting in our national picture. Resource managers in the Western states have been made to realize that the public is demanding high levels of performance in timber harvesting in compliance with state forest practices acts and other state agencies responsible for enforcement of environmental regulations.

However, we would suggest that the public needs to understand more clearly 1- the costs of maintaining high quality environment as wood is harvested, transported, and processed to fill the present increasing needs for fiber and shelter.

To this end we respectfully offer the suggests that the Environmental Impact Statements recognize the benefits of resource management as well 2- as the environmental disturbances. As presently structured only adverse effects are listed. This gives antagonists of timber harvest operations every possibility to emphasize the damage.

We recommend that the material be organized so that each page be split 3- down the middle with adverse effects listed on the left side and with favorable effects for the same item headings outlined on the right side.

To be valid these statements should also include an EIS (Economic Impact Statement) spelling out the cost of achieving the "mitigating actions" 4- and that this be measured by its economic impact on local communities. Too often, the cost impacts are hidden as broad government budget figures or higher costs to timber buyer and processor are not understood as the consequence of accelerating environmental regulations.

Cordially,

C. W. Richen
Vice President,
Northwest Timber Division

CWR-bl
1500 S.W. First Avenue, Portland, Oregon 97201

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Crown Zellerbach

Paragraph #	Response
1, 2, and 3	Both favorable and adverse impacts of the proposed timber management program are described in Chapter III, Environmental Impacts.
4	The Bureau of Land Management does not view the environmental impact statement as the decision-making document. Rather it is designed to display the environmental "costs" of a proposal for consideration of the decisionmaker. For this reason, cost-benefit justification data are not included in the environmental impact statement. Where determined appropriate, however, cost-benefit issues may be included in any subsequent Program Decision Option Document (PDOD). The PDOD identifies the environmental, economic, political, social, and resource developmental aspects of a proposal and its alternatives.

Potlatch

Jay Gruenfeld
Vice President,
Lands and Forestry

Potlatch Corporation
P.O. Box 1016
Lewiston, Idaho 83501
Telephone (208) 799-1482

May 6, 1975

Director (340)
U. S. Department of the Interior
Bureau of Land Management
18th and C Streets, N.W.
Washington, D.C. 20240

Gentlemen:

We appreciate the chance to comment on your January, 1975, Timber Management Draft Environmental Statement. The statement obviously represents a lot of thoughtful work. It should be useful and appears to blanket the subject.

Here are a few comments and suggestions:

1. We think that the usefulness of the statement would be 1a- improved if there was more emphasis on the necessity for cost-benefit determination. For example, in making decisions on trade-offs cost-benefit comparisons are usually essential.

If the cost-benefit was made more pervasive, it would help sharpen some of the objectives. For example, on page I-15 (Major 1b- Objectives and Policies) it states, "...that lands be protected so as to minimize losses or damage to the forest resources as a result of fire, insects and disease." We suggest that to minimize isn't the best objective--perhaps reduce to an acceptable level, or something similar, would be more accurate.

There are somewhat similar examples on I-27, "Cutting areas to be so designed they blend naturally with topography and 1c- landscape. The cutting area should minimize the effect on the total vista..." We believe statements of this type should be qualified, for example, with "practicable", "feasible", etc.

1d- Cost-benefit should also be carefully considered in selecting a cutting method and logging system.

2. Cubic Measurement: On page I-8 it mentions cubic feet may be used as a unit of wood measurement in the next decade. Comment: We think that intensive management makes the use of cubic almost imperative and urge you to adopt it--at least use cubic for your inventory and cut calculations. I hope this will be done in less than five years.

3. Page I-2. Since the western Oregon BLM holding is one of the most productive in the country, it should be made accessible for management. The projected 30 or 40 years to complete the road network appears to be far too long for optimization.

4. Lack of funding has reduced the use of intensive forest practices. Why not suggest that it would benefit the nation if a portion of the timber sales revenues were used to intensify tree farming?

5. Royce Cox, our environmental forester, read the entire text and suggests that in the redraft a special effort should be made to reduce the redundancies.

Your report is a valuable information source. Thank you for the opportunity to review it.

Sincerely,

Jay Gruenfeld

Jay Gruenfeld

JG:mj

cc: R. M. Steele
T. J. Williams
Royce G. Cox
Murl W. Storms

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Potlatch Corporation
Lewiston, Idaho

Paragraph #	Response
1a and 1b	The Bureau of Land Management does not view the environmental impact statement as the decisionmaking document. Rather, it is designed to display the environmental "costs" of a proposal for consideration of the decisionmaker. For this reason, cost-benefit justification data are not included in the environmental impact statement. Where determined appropriate, however, cost-benefit issues may be included in any subsequent Program Decision Option Document (PDOD). The PDOD identifies the environmental, economic, political, social, and resource developmental aspects of a proposal and its alternatives.
1c	Chapter I(D) of the final environmental impact statement has been revised to reflect this comment.
1d	Cost-benefit analysis will be considered in selecting silvicultural systems and logging methods. It will not, however, be the sole determinant in formulating a timber management program for a particular area.
2	Adoption of cubic measurement as a standard measurement of volume will be evaluated during the recalculation of the allowable cut beginning in the fiscal year 1976. As determined appropriate, use of cubic unit measure could occur on a program basis within 5 years.
3	The value of 30-40 years cited in the statement is referring to Bureau lands other than in western Oregon. It has been estimated that the road system in western Oregon will be complete within 20 years. This may decline as far-reaching logging systems are utilized. The text has been clarified to reflect your comment.
4	The proposed timber management action is a balanced program which includes funding of forest development work.
5	The text has been revised to avoid redundancy.

340

ROSBORO LUMBER COMPANY P. O. BOX 1098 • SPRINGFIELD, OREGON 97477
PHONE: 503-746-8411

June 6, 1975

Mr. Curt Berklund
Director, Bureau of Land Management
Washington, D.C. 20240

Dear Mr. Berklund:

Since writing the enclosed Oregon Forest Protection Association letter to Archie Crafts, I have received a copy (also enclosed) of the Bureau of Land Management - D.E.I.S. Timber Management analysis summary.

I would like first to reiterate the major points of the O.F.P.A. letter.

1- 1. Program B (No Timber Management) ignores the presence and needs of man. This would create such a tremendous socio-economic impact that it cannot be considered as an alternative.

2- 2. Program A (Continue current timber management cut) and Program C. (35% reduced timber management cut are valid alternatives of the status quo versus an extreme reduction. There should be a range of alternatives of timber cut where the environmental impacts are balanced with the economic cost and social impacts. Your program alternatives are:

Zero cut	-35% cut	Current cut
B	C	A

A comprehensive range of alternatives would include:

-35% cut -10% cut Current cut +10% cut +30% cut

obviously the increased cut alternatives would be balances against increased investments for intensive management and the effects of increased cut potential would be created over a period of time.

3a- 3. I am anxiously awaiting an opportunity to study the "Three Phase Shetterwood or Partial cut" alternatives. If this is to be taken literally, it would involve a complete biological and ecological change of the forest environment.

ROSBORO LUMBER COMPANY P. O. BOX 1098 • SPRINGFIELD, OREGON 97477
PHONE: 503-746-8411

(page 2)

The analysis summary sheet has some questionable inferences. For instance, under "Aesthetics and Human Interest" programs B and D are shown as favorable major impact while programs A and C. are shown as Adverse major impacts. With the great individual variation of human interests and aesthetic appreciation, how can one catagorize
3b- the current program (A) as "Adverse major"? Many people believe that the Bureau of Land Management timberland is under excellent management and the appearance is beautiful! Or - how can one say that a blowdown and the resultant beetle infection arising from No Timber Management (B) is a "Favorable major". Here again, many people would have the feeling of a reverse impact.

Also under air, the summary shows a "Favorable minor" impact for program B (No Timber Management). This may be true for the first few
3c- years of this alternative but after a decade or so you will most certainly be faced with some uncontrolable wild fires in the deteriating old growth stands which under any circumstances would be an "Adverse major impact.

I am appalled that there is no reference to the impact created
3d- by roads when all studies have shown that 75% to 95% of timber management impact is the result of road construction. A shelterwood or partial cut system(D) would require considerable more road system than your current management program.

Whereas, the ownership pattern and previous management have already
3e- impacted the possibility of wilderness experiences it is doubtful that this catagory has valid application.

Under socio-economic, it should be obvious that the current program
3f- (A) is a "Favorable major" impact that a 35% Reduced program (C) could not possibly be as good and would have to be under the "Adverse major" catagory.

There are many other aspects of the D.E.I.S. which concern me, but since copies are not available and I have not received an answer to my letter to Archie Crafts, I am not able to comment. I am very concerned regarding the method of deciding the future of Oregon's life blood - the timber management program.

Sincerely,

Dave Burwell

Dave Burwell

cc: OFPA letter to Mr. Archie Crafts
cc: BLM-DEIS
cc: Eugene District - BLM

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Rosboro Lumber Company
Springfield, Oregon

Paragraph #	Response
1, 2, and 3a	The Council on Environmental Quality guidelines for preparing environmental impact statements require the identification and discussion of all reasonable alternatives, "including where relevant those not within the existing authority of the responsible agency." In our opinion, the alternatives identified and discussed in Chapter VIII are within the framework of these requirements. It does not, however, indicate the Bureau's preference or endorsement of a particular alternative. Chapter VIII, Alternatives, has also been revised to include an Expanded Timber Management Program alternative as you suggest.
3b and 3c	These summary sheets have been aggregated and now appear as Table VIII-1 (Chapter VIII). This will permit ready comparison of the proposed action with the alternatives. Corrections have also been made and it is our opinion, based on the context in which this information is presented, that Table VIII-1 accurately states the potential impacts of the proposed action and alternatives on the environment.
3d	The impacts of road construction are discussed throughout the environmental impact statement, more specifically in Chapter III.
3e	We believe the final environmental impact statement accurately reflects the potential impacts on wilderness values.
3f	See response to 3b and 3c above.

---

jia-Pacific Corporation
B Eugene, Oregon 97401 503/689-1221

1700

May 1, 1975

U.S. DEPARTMENT OF THE INTERIOR
RECEIVED
MAY 5 1975
BUREAU OF LAND MANAGEMENT
EUGENE, OREGON

Mr. Joseph Dose
District Manager
Bureau of Land Management
1255 Pearl Street
Eugene, OR 97401

Dear Mr. Dose:

This letter is written in respect to your request for public comment on the BLM draft environmental statement. I have two broad-based quarrels with this study.

1- First, I feel that the subject of expanded intensive forest management should have received major attention as the greatest role the BLM lands could play in the economic life of both the private and government sectors. This would be the extreme contrast to the opposite extreme of a "do nothing" or non-management posture.

2- Secondly, I feel the economic impact action of this report is extremely lacking in full illumination of all options available in the management of these lands.

Sincerely,

Robert F. Kline
Resource Manager

djh

TITLE	INIT
Dist. Manager	
Asst. Dist. Mgr.	
Area Mgr. - Noti	
Area Mgr. - Lorane	
Area Mgr. - Mohawk	
Area Mgr. - Dorena	
Admin. Officer	
Chief, Div. Resources	
Timber Mgmt. Spec.	
District Appraiser	
Realty Officer	
Realty Specialist	
Res. Mgmt. & I&E Spec.	
For. Dev. & Wildlife	
Fisheries Spec.	
Soils Specialist	
Mineralogy Spec.	
District Engineer	
(Files) (Library)	

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Georgia - Pacific Corporation
Eugene, Oregon 97401

Paragraph #	Response
1	Alternative B, Expanded Timber Management Program, has been added to Chapter VIII of the final environmental impact statement.
2	The Bureau of Land Management does not view the environmental impact statement as the decision-making document. Rather, it is designed to display the environmental "costs" of a proposal for consideration of the decisionmaker. For this reason, detailed economic analysis (i.e., cost-benefit issues) are not included in the environmental impact statement.

Divisions
DRAIN PLYWOOD
836-2144
MT. BALDY MILL
849-2168

Woolley Enterprises, Inc.
DRAIN, OREGON 97435

Divisions
SMITH RIVER LUMBER
836-2131
WOOLLEY LOGGING
836-2816

June 11, 1975

U. S. Department of the Interior
Bureau of Land Management
Washington, DC 20240

Gentlemen:

1- The following are my comments on the Bureau of Land Management's "Timber Management: A Draft Environmental Statement." Generally, in review of the whole effort, while it does seem worthwhile to be as extensive and intensive about policy statements as this is, I wonder if too many bases are being covered. You cannot substitute policy statements, no matter how broad, for careful on-the-ground administration of specific situations.

Most of my reactions from here on are concerned with Section IV, Mitigative Measures to be followed in Timber Management.

Logging

2- Tractor skidding can be done during the moist periods of the year with little or no damage to soils. If the volumes to be removed are scattered and light. Partial cut situations are a good example especially where dirt does not have to be moved to develop.skid roads. Stream cossings if done in the right place - i.e., bedrock crossings with low banks - and during the right time of year can be done with virtually no effect to the aquatic environment.

3- High lead logging and the resultant effect to the environment should be assessed as to downhill or uphill yarding. Our experience with downhill is less scarification of the soil and less brush disturbance. Therefore, limiting this type of logging during periods of heavy rainfall does not make good sense. Even uphill yarding while disturbing the soil to a greater extent, only affects say the last 100 feet of the skid road, and from there the water is dispersed fan wise downhill throughout the unit to filter through the slash. If all the buffer strips are going to be left as indicated, most if not all of this type of sediment will be trapped anyhow.

Transportation

4- By maximizing the vertical cut, has the alternative of rolling grades to fit the topography been eliminated? Obviously, if you roll or break grades of road systems, you end up with longer roads, but if you can reduce the amount of soil excavated, and fit the road to the ground you have also minimized or eliminated sidecast, erosion, endhaul, and waste site problems

5-By flattening cut slopes you create more dirt to be excavated. Thereby, creating more problems of what to do with this material. Good road design, construction, and maintenance should take care of the cut banks along with Mother Nature's natural angle of repose.

6-I feel more nonessential spur roads should be abandoned and put back into production. One major reason for this, is the continued maintenance it requires to keep these roads in shape, because people will use them just because they are there.

Water Quality

7-We need a better definition of what is to be expected along and near streams that carry water only during peak loads. And even more important, is how far up these streams do these mitigative measures go?

Alternatives

8-During the three phase partial or shelterwood cutting, would not road building actually be increased, even beyond what is forecast. This is due to the decreased logging reaches that are usually found to be desirable in this kind of operation. That is, unless some type of aerial system is to be employed.

Summary

9-Quote, "Intensive forest management is compatible with protection and improvement of the forest environment," unquote. Thus, it would seem if adequate funds and manpower were provided that an all-out effort could be made to sustain the yield of multiple use products from the forest, and still protect the environment. Any activity of mans in the forest are necessarily detrimental, but Mother Nature is not passive.

Very truly yours,

WOOLLEY ENTERPRISES, INC.

Jerry A. Boucock

Jerry A. Boucock
Forester

JAB:drd

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Woolley Enterprises, Inc.
Drain, Oregon 97435

Paragraph #	Response
1	One of the primary objectives of the Timber Management environmental impact statement (EIS) is to provide a basic foundation and framework for subsequent site-specific environmental impact statements which will cover each of the 13 sustained-yield units in western Oregon and for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California. These documents will be directed toward the on-the-ground administration of the timber sale program.
2	The statement does not completely preclude tractor skidding "during moist periods of the year." Rather, it states in Chapter IV that tractor skidding will be limited to those seasons and sites where soil moisture is low enough to avoid soil damage. This would depend on site-specific factors; e.g., soil type, depth of litter and humus layers covering mineral soil, etc. Under authority of the timber sale contract, the Bureau may suspend logging operations whenever necessary to protect soils and watersheds. Use of this authority provides the flexibility necessary to control operations according to need.
3	The statement does not state that downhill high-lead yarding must be avoided because of potential environmental damage. It merely points out that there are practical disadvantages to yarding downhill by high-lead.
4	Section IV of the statement, concerning transportation, has been revised to reflect your comments.
6	It is the practice of the Bureau that nonessential roads be put-to-bed. This usually involves scarifying, water-barring, seeding and, if necessary, blocking the road.

Woolley Enterprises, Inc.
(Continued)

Paragraph #	Response
7	Mitigative measures used to protect perennial streams and those streams which carry water during peak runoff seasons are described in Chapter IV(D). More specific mitigative measures (i.e., buffer widths, type buffers, distances, etc.) must be handled on a case-by-case basis and, therefore, will be considered at the time site-specific environmental analysis records are prepared.
8	In reevaluating this situation, we concluded that there would be no significant difference between the miles of road needed for a partial or shelterwood system as opposed to a mix of shelterwood and clearcut as proposed. Aerial systems and systems traditionally considered clearcut logging methods are becoming more prevalent in shelterwood or partial cut operations.
9	We agree with the comment.

AMERICAN FORESTRY ASSOCIATION
Centennial
1875-1975
1319 Eighteenth Street NW Washington DC 20036 telephone (202) 467-5810

May 22, 1975

Mr. Roman H. Koenings
Assistant Director
Bureau of Land Management
U. S. Department of the Interior
Washington, D. C. 20240

Dear Rome:

Deadlines have a way of getting past before we realize it, and I know this letter is well beyond the May 7 date for comments on BLM's National Timber Management Program, but hope that "late" still is better than "never."

1-This EIS contains a tremendous amount of information. In general, it is a candid and comprehensive statement. Most of the environmental hazards are cataloged, but there is little information on how BLM will operate to minimize the problems. Most of it has to be taken on faith, we presume, at least at this level of planning.

2-There is certain to be some objection because this is essentially a "timber" management program rather than a "forest" management program. Resources and uses cannot be planned nor managed independently. Much criticism already is being made of forestry because it tends to focus too strongly on timber and not enough on other resources and uses. As an example, this statement adequately points out potential wildlife hazards but fails to show how wildlife management objectives can be built directly into operating plans. Perhaps we never can maximize all objectives of multiple use management, but we can optimize better mixtures of values if each use is built into the planning process.

3-None of us in AFA has had any direct experience in BLM timber management operations, so our comments are both brief and general. In total, this is a good statement that shows sound professional thinking. We commend BLM on its thoroughness in timber management thinking, but suggest that maybe more thought should be given to multiple use planning. However, no plan is better than its implementation, and I would trust BLM foresters in watching out for all public interests on these important public lands.

Sincerely,

William E. Towell

William E. Towell
Executive Vice President

Publishers of AMERICAN FORESTS

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

American Forestry Association
Washington, D.C. 20036

Paragraph #	Response
1	Chapter IV of the final environmental impact statement describes those measures which will be employed to mitigate adverse impacts. Additionally, Chapter I points out that site-specific environmental analysis will be required on all timber management actions, i.e., timber sales, reforestation projects, thinnings, etc., which could significantly impact the human environment. These site-specific analyses will identify not only impacts but, also, the means by which impacts will be mitigated.
2 and 3	The proposed timber management program is a component of a multiple-use plan, called a Management Framework Plan (MFP), which is briefly described and explained in Chapter I(C).

INDUSTRIAL FORESTRY ASSOCIATION
SERVING FOREST OWNERS, LOGGERS, WOOD USERS
THROUGHOUT THE DOUGLAS FIR REGION

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1220 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201

Telephone:
(503) 222-9505

June 10, 1975

AIR MAIL

Mr. Curt Berklund, Director
Department of Interior
Bureau of Land Management
18th & C Streets, N. W.
Washington, D. C. 20240

Dear Mr. Berklund: BLM EIS on National Timber Management Program

On behalf of the 116 members of IFA who buy more than half of the BLM timber offered for sale in Western Oregon, I would like to submit the following comments regarding the Bureau of Land Management's draft Environmental Impact Statement on its National Timber Management Program. These comments basically refer to the portion of the statement dealing with the BLM (O&C) lands in Western Oregon.

The BLM managed lands in Western Oregon are on an average highly productive for timber management. To a great extent, they are intermingled in a checkerboard pattern with private industrially-owned forests which are managed intensively for production of timber. As noted in the draft EIS, these lands provide a significant part of the raw material for Oregon's basic industry.

1- It is imperative that the timber production from these lands be maintained at no less than the present level. As improvements in technology or increases in application of intensive forest management are initiated, the annual timber production from these lands should be increased. The potential annual growth could be in excess of the estimated 1.275 billion board feet.

2- We would suggest that the BLM set a minimum goal of harvesting 1.275 billion board feet annually in Western Oregon. This would be a key goal in land use planning efforts for these lands. Such a goal would be entirely compatible with realistic goals for production of recreation, wildlife, watersheds, minerals, grazing and other benefits.

Specific comments on portions of the draft Environmental Impact Statement follow:

3- Pages 1-3 - Introduction: An important aspect required under NEPA is coverage of impact on economics. This is covered in the statement in general, but is not adequately covered for specific items such as partial cutting, stage logging, aerial logging systems, and centralizing rock pits. Such economic considerations need to consider energy conservation.

Informed Forestry Action

Mr. Curt Berklund
June 10, 1975
Page - 2 -

4- Page I-2: On the last sentence in the first paragraph we would comment that local climate, topography, aspect and silviculture of the tree species involved should be the determining factors for the system of harvesting.

5- Page I-2, second paragraph: Future trends toward "far-reaching logging systems" is hard to predict. Energy conservation may reduce the use of some of these systems. Presently, it appears that some kind of minimum impact road system will be needed for nearly all forestlands to provide access for management, protection, salvage and possible harvest of future crops.

6- Page I-6: BLM should continually review the classification of the 108,000 acres not available due to critical watershed and fragile site conditions with the objective of returning these lands to productivity. These are the areas where special harvesting methods and equipment could logically be used.

7- Page I-34: Any satisfactory planting program needs follow-up surveys and replanting if necessary within as short a time as possible.

8- Page III-26-32. This section on Impact on Soils does not point out that effect of the various activities outlined, including logging and road building, vary tremendously with type of soil. The reference to quarrying, on page III-31, exaggerates the impact of a properly developed rock pit.

9- Page III-34: Slash fires should not cause significant problems with streams, as important streams should be protected by fire lines, slash pull-in, stream clean out or buffer strips of green vegetation.

10- Page III-54-58: The discussion on cutting practices does not emphasize that in most of Western Oregon artificial regeneration by planting is the normal practice with most forestland managers on both clear-cuts and shelterwood areas. In shelterwoods the removal of the overstory, when the reproduction is established, can cause considerable damage and expense.

11- Page III-94: The implication that all timber management activities are unsightly is not true. Well planned and utilized clearcut harvested areas often get as much use by the casual recreationist as timbered areas during the cooler parts of the year. Thinning often improves the "looks" of a forested area.

12- Page IV-11, last paragraph: In many cases, smaller pits closer to area of use would have less overall impact and greatly reduce energy consumption and total cost. Small sources of good rock, often difficult to find, should be developed and utilized.

13- Page IV-18: Non-chemical methods of pest control should be used in place of proven satisfactory chemical control only if they will do a satisfactory job of pest control.

14- Page IV-22, first paragraph: Buffer strips are not needed on all perennial and intermittent streams, either to maintain stream temperatures or control siltation. Precipitation, soil type, exposure regrowth rate of vegetation should determine if a buffer strip is needed. When needed, shrubs alone may provide a satisfactory buffer.

Mr. Curt Berklund
June 10, 1975
Page - 3 -

15- Page IV-22-23: Stream clean out is often best handled by a special crew after the regular logging. This should be completed, however, before season of heavy runoff. Clean-up should consist only of removal of logging debris and not natural debris.

16- Falling has to fit the logging method. Uphill falling is not always possible or practical and can be very expensive and time-consuming.

17- Page IV-26: In areas along the Oregon Coast Range, broadcast slash burning is necessary to eliminate the fire hazard of the slash, but also reduce brush competition with the new tree crop.

18- Page IV-51: Roadside buffer strips of old-growth timber have proved a problem as they are very subject to windthrow. Irregular clear-cuts along roads are a tool used by many landscape architects. Planting these areas with large planting stock will soon provide a green screen if really needed. Visual resource management should not be an overriding factor; it should be just one consideration in determining forest management.

19- Pages VIII-1-46: The three alternatives listed all provide less than the current timber yield. There is no alternative which would increase the timber yield to its maximum potential. Such an alternative is just as practical as the No Timber Management Program. A maximum yield program should be developed, at least for the forests of Western Oregon, which would consider all the lands including those not currently available to be managed for full timber production. Such an alternative would give a base to determine effect of current restriction on timber management.

In summary, we could have made numerous other comments on specific sections of the statement. We would like to point out that blanket rules seldom work in forest management. First, goals must be set and then procedures used which fit the local situation.

We appreciate this opportunity to comment on the draft Environmental Impact Statement and look forward to working with the BLM on an intensified program of forestland management for Western Oregon.

Very truly yours,

N E Bjorklund
N. E. Bjorklund
Vice President - Public Forestry

NEB:jo

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Industrial Forestry Association
Portland, Oregon 97201

Paragraph #	Response
1 and 2	As intensive timber management practices are proven to be environmentally, technically, and economically feasible, they will be implemented on lands available for timber harvest, and the annual growth and cut for these lands increased accordingly. In order to maintain program flexibility in meeting changing public needs, no assurances can be made regarding future target production levels.
3	The Bureau of Land Management does not view the environmental impact statement as the decisionmaking document. Rather, it is designed to display the environmental "costs" and risks of a proposal for consideration of the decisionmaker. For this reason, cost-benefit justification data are not included in the environmental impact statement. Where determined appropriate, however, cost-benefit issues may be included in any subsequent Program Decision Option Document (PDOD).
4	We agree. This sentence is merely indicating that intensive management in second-growth forest will involve several stand entries to maximize production. In many cases, final harvest of these stands may not occur until after full stocking of the understory. Thus, clearcutting per se will be reduced in favor of the continuous canopy management concept.
5	Out comment concerning far-reaching logging systems is intended only to point out the possibility of further use of these systems; thus, a possibility for a declining need for extensive road networks.
6	The Bureau will continue to review all commercial forest lands excluded from the timber production base. Where new knowledge or technological advancements in logging methods permit, these lands will be made available for timber production provided, of course, this is consistent with multiple-use objectives as determined through the Bureau Planning System.

Industrial Forestry Association
(Continued)

Paragraph #	Response
7	Chapter IV, Mitigating Measures, has been revised to indicate that follow-up surveys and replanting may be necessary to assure adequate reforestation.
8	Chapter III(C), Impact on Soils, recognizes that impacts to soils caused by logging, road building, and other activities are largely dependent upon soil types, weather, topography, and equipment. Impacts to specific soils under specified conditions will be considered in the site-specific environmental analysis prepared for individual timber management activities (i.e., timber sales, thinnings, etc.).
9	The use of buffer strips or filter strips to protect water quality is acknowledged in Chapter IV, Mitigative Measures. All of the measures that you mention are viable alternatives for protection of water quality and are available to the resource manager for prescribed burns.
10	Chapter III discusses the unmitigated impacts. Further, the Bureau has not planted or seeded shelterwood areas on a large scale.
11	Chapter III has been revised to reflect this comment.
12	Our reference to the use of a single, large quarry rather than several small pits is to be taken only as a consideration in the development of a road system. We realize good rock is a depleting resource and that smaller pits may be necessary.
13	We believe the final environmental impact statement adequately and accurately states the Bureau's policy concerning use of non-chemical methods of pest control.

Industrial Forestry Association
(Continued)

Paragraph #	Response
14	This same paragraph further states that "The width of the buffer strip necessary to meet these objectives will consider the slope of the ground into the stream channel, topographic shading, vegetation height, density and species; . . . erodibility of the soil." Certain of these factors or others, could in certain instances, negate the need for buffer strips comprised of trees.
15	Chapter IV(D) has been revised to reflect your comment relative to "cleanup should . . . removal of logging debris . . . .". As indicated by the statement, however, logging debris should be removed from stream channels concurrent with logging since blockages will impact aquatic biota and water quality.
16	This statement in Chapter IV(D) has been qualified.
17	The need for specific burning practices, as in the coast range of Oregon, will be utilized when an analysis proves that they are favorable for on-site and off-site environmental quality.
18	Chapter IV(J)(1)(a) has been revised to reflect more recent Visual Resource Management techniques. These techniques do not, however, totally eliminate the need for the more "conventional" roadside buffer strips but rather integrate the concept of buffer areas into the overall Visual Resource Management Program.
19	Chapter VIII has been revised to include an Expanded Timber Management Program.

NORTH WEST TIMBER ASSOCIATION
1355 OAK STREET • P.O. BOX 5554 • EUGENE, OREGON 97405
TELEPHONE: (503) 686-9603

May 9, 1975

Mr. Curtis J. Berklund
Director
BUREAU OF LAND MANAGEMENT
U. S. Department of the Interior
18th and "C" Streets, N.W.
Washington, D. C. 20240

Dear Curt:

Just a brief comment on the Bureau of Land Management's Timber Management Draft Environmental Statement.

We support the action you have proposed, i.e. no major changes in the current program.

1- The mills in our membership rely heavily on timber sold from the BLM lands and are totally dependent on the Federal government for their log supply.

2- The BLM's role in the economy of Western Oregon and the Nation is extremely important. We would find any alternatives that diminish that role totally unacceptable.

3- We hope you and your staff recognize that with timely application of intensive forest management techniques, future timber supply can be substantially higher than your projections.

4- Decisions about future management direction should, to the fullest extent possible, use the Public Domain, O&C, and CBWR lands to assure a permanent, high-level timber supply.

Thank you for the opportunity to comment.

Sincerely,

NORTH WEST TIMBER ASSOCIATION

Arnold Ewing

ARNOLD D. EWING
Executive Vice President

ADE:st

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

North West Timber Association
Eugene, Oregon 97405

Paragraph #	Response
1, 2, 3, and 4	The importance of the BLM and the timber produced from the public lands in western Oregon is recognized. Future Bureau management efforts will insure adequate timber supplies to local economies consistent with other resource uses and values and environmental protection.

UTAH MINING ASSOCIATION
INCORPORATED
KEARNS BUILDING
SALT LAKE CITY, UTAH 84101
TELEPHONE (801) 364-1874

PAUL S. RATTLE
MANAGER

ERIC C. RYBERG
PRESIDENT

S. S. SMITH
VICE PRESIDENT

JOSEPH C. BENNETT
VICE PRESIDENT

SHIRL C. McARTHUR
VICE PRESIDENT

April 11, 1975

Mr. Curt Berklund, Director
Bureau of Land Management
Department of the Interior
Washington, D.C. 20240

Dear Curt:

Thank you for sending me a copy of the BLM's draft environmental statement 75-10 for Timber Management on lands managed by the BLM. It is quite a tome and, I suppose, required under the NEPA.

Of course, timber management is somewhat outside of my field of concern but because the statement mentions minerals, I do have comments on two such related expressions appearing in the report.

Section III deals with the Environmental Impacts of Timber Management programs on the public lands and on page III-88 the following comment is made:

> "b. Mineral Development
>
> 1- Most of the proposed practices can have emotional impacts upon prospectors or mining claimants. Many of these people are individualists who look askance at any activity that they consider an encroachment of their legal rights to explore and develop mineral deposits on public lands for personal gain. This attitude can embrace any one or all of the activities associated with the timber management program. Nonetheless, the impact is essentially a personal one without significant effect on the progress of actual mineral development or the economic welfare of the individuals involved."

2- Now, I submit that this is a misleading, inept expression of narrow perspective and limited validity. The same point of view could be expressed about certain selected individuals who may use timbered lands for livestock grazing, for recreation or for other uses. The impression is given that all or most prospectors and miners and only such prospectors and miners are emotional types who resent interference and whose only concern is personal gain. The statement also suggests that this type of concern has no basis in fact. The net result is to select a kind of administrative problem that can exist and suggest that it is typical but of no factual import. The relationship that is alluded to here is the typical potential problem that can develop where ever the multiple

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use concept in land use takes place. Wherever two or more user groups desire or are forced to use the same land area, conflicts can develop between them and with any administrative authority managing the land. Whether or to what extent emotions play a part in the process, as in most human relationships, depends largely on the specific issues at hand, how they are handled and the individual personalities involved. I would suggest that the inclusion of the above quoted expression in the draft EIS will tend to polarize and amplify the kind of problem that this expression attempts to indicate.

Section VIII deals with alternatives and with substitute materials that might be used in place of timber products. The following is quoted from page VIII-44:

> 3- "The increased production of many substitute materials to offset reduced timber production will increase the activities and hence the environmental impacts associated with mining, extracting and manufacturing processes on air, water and land. Generally, the adverse environmental impacts stemming from the manufacture of steel, aluminum and concrete products in terms of air and water pollution are of greater magnitude than those resulting from the manufacture of lumber and plywood products. In addition, the consumption of electrical energy to produce such materials as steel, concrete, and aluminum will be increased thus adding to the current energy shortage. As an example, 39,620 Kilowatt-hours are used to produce a ton of aluminum while 936 Kilowatt hours are used to manufacture a ton of lumber. There are likewise substantial differences in heating and cooling costs between houses built with alternative materials. Recent reports indicate that the energy needed to heat a wood frame house is 23% below that required for a masonary house and 16% less energy for cooling purposes. In view of the costs and capacity for producing energy to manufacture substitutes and the attendant impacts on air, land and water, such differentials as previously mentioned must be considered to be environmentally, economically, and socially significant."

4- Again, I suggest this is a superficial statement that has limited validity and can be grossly misleading. To suggest that domestic timber on the public lands is sufficiently available to substantially offset the need for steel, concrete and other mineral building materials - all in the interest of energy conservation - would require extensive factual support that is not provided. The examples given in the quoted statement are fallacies: To state that more energy is required to produce a ton of aluminum than a ton of lumber, in this context, is to suggest that a ton of each product has equal utilitarian construction value which is certainly not the case. Similarly, to state that the energy requirements for heating and cooling wooden buildings are less than for masonry or steel buildings must be in error. In terms of new construction - the only type that applies in this context - energy demands will relate to the quality of construction and insulation provided, and not to the basic materials used for constructing the building. The materials of construction used in a given situation are usually governed by a very complex balance of economics, logistics, materials availability and human resources, coupled with esthetic factors such as taste and style. Economics may well be the primary factor.

5- It is interesting to note the extensive effort by the BLM on this Timber Management EIS - a project that is being duplicated by the Forest Service.

I hope these comments may be of some value.

Cordially,

Paul

Paul S. Rattle

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Utah Mining Council
Salt Lake City, Utah 84101

Paragraph #	Response
1 and 2	Chapter III(I)(2) has been revised to reflect this comment.
3 and 4	Alternative F, Chapter VIII (paragraph 3) has been clarified. We would also like to emphasize that Alternative F does not imply that timber on the public lands is in sufficient quantity to substantially offset the need for substitute materials such as steel, concrete, etc. This Alternative merely points out that if the Bureau ceased its timber management program, substitute materials could be in greater demand. Consequently, environmental impacts could be translocated from forests and forest industries to other industries and/or to other regions of the country. With respect to the energy cost comparisons cited in paragraph 3 of Alternative F, we refer you to the cited reference entitled, Environmental Costs of Alternative Materials.
5	The environmental impact statement, Timber Management, covers only those timber management activities on Bureau-administered lands. Forest Service lands and their respective timber management activities are not included in this statement.

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LAW OFFICES
LEONARD B. NETZORG
SUITE 216 MOHAWK BUILDING
222 S.W. MORRISON STREET
PORTLAND, OREGON 97204
TELEPHONE: 226-7276

April 18, 1975

Mr. Kurt Berklund, Director
Bureau of Land Management
Department of the Interior
Washington, D. C.

Dear Mr. Berklund:

On behalf of its members--manufacturers of lumber and plywood in the Western states--Western Forest Industries Association has asked me to comment on BLM's Draft Environmental Statement for Timber Management, DES75-10.

I. LACK OF DETAIL

1- This draft EIS is a compendium of generalities. It is an umbrella statement " * * * encompassing so much territory as to defeat clear understanding of the issues, as well as ordered community response." Daly v. Volpe, __F2d__ (9th Cir., March 20, 1975); Indian Lookout Alliance v. Volpe, 484 F2d 11, 19 (8th Cir. 1973).

In substituting broad generalities for the details required by NEPA, this draft is not unlike BLM's EIS on grazing activities. One is unable to determine what is proposed or may be the reasonable alternatives to be considered for Eastern Oregon, for Eastern Montana, for Northern Idaho, etc. We are told only that for the totality of the Western states there is the usual alternative of no timber harvesting or of a harvest reduced from present levels. But in North Idaho, for example, is the harvest to
2- increase, being offset by reductions in Arizona? Or is the cut level in North Idaho to be reduced to the Western average or below the Western average? For want of any such reasonable detail and analysis on a localized basis and for want of an analysis of costs and benefits in each "geographically individualized" area, public participation in the development of the program must be minimal if not actually illusory. Trout Unlimited v. Morton, __F2d__ (9th Cir. 1974); N.R.D.C. v. Morton, __F.Supp.__ (No. 73-1983, Dist. Ct., D.C.)

II. WESTERN OREGON

3- NEPA does not repeal and is not intended by implication to repeal any other statute. United States v. SCRAP, 412 U.S. 669 (1973). While " * * * Congress has mandated [through NEPA] that environmental exigencies must be considered by [BLM], Congress has nowhere determined that such considerations must work to the abandonment of other federally mandated goals and projects." Daly v. Volpe, supra. NEPA, itself, affirmatively requires that the Act be executed " * * * consistent with other essential considerations of national policy * * *." 42 USC §4331(b).

In this context, Congress has mandated that O&C lands classified as timberlands,

4-
> " * * * shall be managed * * * for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal (sic) of sustained yield for the purpose of providing a permanent timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities, and providing recreational facilities * * *." 43 USC §1181a.

5- It is to be noted that these congressionally stated purposes are to be achieved by selling and cutting the timber--not by storing it on the stump. The goal, obviously, is a vigorously growing, ever regenerating forest that through intensive management and constant harvesting produces a variety of both national and local physical, social and economic benefits.

6- This draft EIS, however, states in essence only two alternatives. First is no timber harvesting, an alternative that contravenes both the O&C Act, the principles and purposes of that Act, and NEPA's insistence on consistency with other national policies.

The second alternative is a limited timber management program that would reduce the current annual cut of 1.2 billion board feet in the O&C area by about 35%. This, in turn, would result in the loss of about 12,000 primary and secondary timber related jobs and in some communities reduce employment by as much as 12%. Draft EIS, p. VIII-24. It would
7-- eradicate 36% of all the primary and secondary jobs created by the present level of timber harvesting on BLM lands in Western Oregon. Draft EIS, p. I-4. This disaster BLM labels a "Major," "Favorable" "Socio-Economic Environmental Component" of its apparently proposed limited timber management program. Draft EIS, p. VIII-27. George Orwell was prophetic.

The draft EIS further acknowledges that this alternative of
8- a 35% reduction in the timber harvest on BLM lands in Western Oregon

> "* * * would widen the existing and projected gap between supply and demand with attendant increased prices of material and, in turn, housing." Draft EIS, p. VIII-24.

NEPA does not require this consequence. Rather, NEPA affirmatively directs that that Act be executed consistently with other essential con-
9- siderations of national policy. Yet in proposing this program as realistically the sole alternative, the draft EIS ignores a national policy enacted in 1949 and re-enacted and "reaffirmed" in 1969:

> "The Congress declares that the general welfare and security of the Nation and the health and living standards of its people require * * * the realization as soon as feasible of the goal of a decent home * * * for every American family * * *." Housing Act of 1949, §2; 42 USC 1441.
>
> "The Congress finds that the supply of the Nation's housing is not increasing rapidly enough to meet the national housing goal, established in the Housing Act of 1949, of the 'realization as soon as feasible of a decent home * * * for every American family.' The Congress reaffirms this national housing goal * * *." 42 USC 1441a.

III. CONCLUSION

Lacking detail, this draft EIS is a compendium of generalities. Nowhere does it offer facts into which the interested public in any community can sink its teeth. Even in its consideration of Western Oregon, the draft is wide of the mark in supplying the kind of detail that would
10-enable both the public and immediate and ultimate decisionmakers--including the President and the Congress--to come to an informed decision. N.R.D.C. v. Morton, 458 F2d 827 (D.C. Cir. 1972). Conclusory generalities salted with an occasional digit hardly meet the test of legal adequacy.

Moreover, there is a failure to state and explore reasonable alternatives. For example, what would be the social, economic and ecological consequences in each localized, geographically individualized area of
11-(1) maintaining and (2) increasing the current levels of harvest? Surely, these are alternatives that are "reasonably related to the purposes of the project." Trout Unlimited v. Morton, supra.

> "Circulation of a grossly inadequate [draft] statement * * * could conceivably frustrate the goal of obtaining informed agency and public comment on the environmental consequences of a proposed project, and in some circumstances this could amount to a violation of the responsible agency's duty * * *." Lathan v. Brinegar, 506 F2d 677 (9th Cir. 1974)

This draft statement is grossly inadequate. It is insufficient to support a final EIS. What is required is a series of new draft statements, each done on a geographically localized basis, that conforms
12-to all of NEPA's requirements, including detailed exposition and analysis of the reasonable alternatives that are available to the agency, to the Executive Branch and to the Congress.

Sincerely yours,
Leonard B. Netzorg
LEONARD B. NETZORG

LBN:jg

cc: Hon. Mark O. Hatfield, U.S.S.
Hon. James McClure, U.S.S.
Mr. Joseph W. McCracken

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Leonard B. Netzorg (on behalf of:
Western Forest Industries Association
Portland, Oregon 97204

Paragraph #	Response
Part I 1 and 2	An objective of the Timber Management environmental impact statement is to provide a basic and general description of timber management practices and an evaluation of their individual, combined, and cumulative environmental impacts on a programwide basis and the measures to be followed for their mitigation. Additionally, the statement provides the public and Bureau personnel with information to be used in evaluating alternative actions on a programwide bases. We believe the final environmental impact statement fulfills these basic objectives. Detail and analysis on a more localized or site-specific basis as you suggest, however, will be an integral part of subsequent environmental impact statements which will be prepared covering each of the sustained yield units in western Oregon and for the timber management programs in the Couer d'Alene District, Idaho and Ukiah District, California (See Chapter I(D) for preparation schedule).

Leonard B. Netzorg (on behalf of:)
Western Forest Industries Association
Portland, Oregon 97204
(Continued)

Paragraph 3	Response
Part II 3, 4, 5, 6, 7,	The Council on Environmental Quality guidelines Preparation of Environmental Impact Statements requires that the responsible agency "explore and objectively evaluate the potential environmental impacts of all reasonable alternatives, particularly those that might enhance environmental quality or avoid some or all of the adverse environmental effects." This analysis should include, where relative, those (alternatives) not within the existing authority of the responsible agency. Based on these regulatory guidelines, we believe that the final environmental impact statement (EIS) adequately and accurately describes possible alternatives to the proposed action. This section (Chapter VIII) of the EIS has been revised to include the Expanded Timber Management Program alternative. The impact summary tables have also been revised and aggregated for comparison purposes. These summaries now appear in Table VIII-1, Chapter VIII.
Part III 10, 11, and 12	Since publishing the draft environmental impact statement, Timber Management, the Bureau has determined that it will be necessary to prepare site-specific environmental impact statements covering each of the sustained-yield units of western Oregon. Environmental impact statements will also be prepared for the timber management programs in the Couer d'Alene District, Idaho and the Ukiah District, Idaho. The Bureau will also continue its policy of preparing environmental assessments on each timber management activity (i.e., timber sale, reforestation project, thinning contract, etc.). Chapter I of the text has been revised to reflect these Bureau commitments.

June 11, 1975

Mr. Curt Berklund, Director
Bureau of Land Management
U. S. Dept. of the Interior
Washington, D.C. 20240

Dear Mr. Berklund:

1- This letter is comment on your Draft Environmental Statement For Timber Management (DES 75-10). It is from a group of Citizens who are mutually appalled with the current land practices of your Bureau and are even more shocked that your future plans call for more of the same on a more intensive scale. We don't think we are a group of starry-eyed environmentalists and we recognize the need for the timber industry. However, we are united in the belief that the principle of multiple use is a facade to hide behind, has not worked, is not working and will not work. The principle (when did it become a principle) of multiple use has resulted in most of our public land's being handed over to the timber industry. This in turn is resulting in (despite the many pages you cite to the contrary) the slow but sure destruction of all other values. We have countless historical examples here in Mendocino County (repeated in counties up and down the west coast) where intensive timber management, regardless of how it was done, has resulted in galloping erosion due to increased run off, destruction of the wildlife due to changed habitat, plus lumber road hunter-access, and recreation in general ruined because of the aesthetic changes that occur. Your own summary of adverse environmental effects hides what in fact is happening with such comforting phrases as "occasional massive soil movements," "an occasional site may be inadvertantly destroyed," "a minor temporary nuisance to human inhabitants," "temporarily distupt the balanced relationship," "natural waters will be occasionally muddied or invaded by debris," "recreational use will be temporarily disrupted," "surface runoff on disturbed areas will accelerate to a minor degree," "sedimentation will temporarily degrade water quality," "displacement of wildlife will result in temporary reductions," etc. etc. We can't help but feel that any of your people who have been out in the field for a number of years in the western states would recognize that "minor" is major, that "temporarily" is permanently, that "occasional" is frequent and that "multiple" use is ultimately single use.

2- If multiple use does not work then what will? This group strongly believes that it would be in the government's interest, the public's interest and ultimately the timber industry's interest if one half of the BLM-administered lands (including forest land) were assigned to a custodial state to remain in its natural condition - with the emphasis on recreation, wildlife and environment. The other half to be devoted to intensive timber management with the restraints outlined in your draft environmental statement, but recognizing what it is going to do to the land and environment. On pages 1-13 of your draft you are assigned an impossible task, namely "the basic guidance set forth in these authorities requires that forest lands be managed under the principles of multiple use, sustained yield and environmental quality." This simply is a job that cannot be done and makes your draft environmental statement a farce when read by anyone who has seen first hand what is happening to ecological blaances and environmental quality under the multiple use disguise in our national forests.

3- You may maintain that withholding any large block of forest land would have a severe economic effect. The 2% of the nation's lumber BLM land supplies would become 1%. If 1% of our lumber supply is going to cause an economic crisis we are indeed in trouble. Your own draft recognizes that Forest Service land could more than make up for any withholding of BLM land.

4- This group recognizes that the withholding of 50% of BLM forest land represents in your eyes a sizeable amount. Yet when translated into total land in an area it is a very small amount. For example, here in our Mendocino County there are 1,316,000 acres of timberland. Of this total, BLM timberland accounts for approximately 35,000 acres. If half of this (an area of 17,500 acres) were withheld it would represent just above 1% of the total timberland of the County. It would represent a chance to save the endangered wildlife (the fox, bear, cougars, bobcats, eagles); they still exist in our county but not in intensively managed forests. It would represent a chance to have some non-erosion natural watershed areas with natural streams. They still exist in the County but not in intensively managed forests. It would represent a chance for our grandchildren to see what our country once looked like. They won't see that in intensively managed forests.

5- And so we look at your balancing act Draft Environmental Statement with dismay. You are in the lumber business first and while you can't admit it everything else is secondary. You have ten year quotas on timber but you don't have any quotas on natural areas, recreation sites, wildlife, etc.

6- Why can't the public have a quota of one-half of their land? Then you would have true multiple use - one-half for the timber industry, one-half for the public. Probably this group knows the answer to this question and wonders why take the time to read several hundred pages and then take the time to assemble collective thoughts into a letter.

7- And yet, there must be a Mr. Berklund. And he must know what intensive forest management means to the environment, recreation, wildlife, aesthetics, and to our very heritage. And he must suspect that millions of citizens would rather save some of their land, than to exact every last dollar from it. And he has to be concious of the fact that BLM is the only one in many areas who has any natural virgin land left. Can he honestly believe it is in the national interest and the citizens' interest to convert the vast majority of BLM timber holdings into sterile roaded and eroded tree farms?

8- In your "draft" you state that the view of the public is an input to the decision-making process. The public recently was invited to participate in the "East Mendocino Planning Unit Management Framework Plan." Members of this Committee participated in the initial planning meeting, two members were on the 7-man panel held later and again members of this Committee participated in the final public meeting held to resolve the conflicts. In this last meeting the vote was 63 to 2 in favor of a resolution (a copy of which is attached) which calls for 13,100 acres of forest land to be held for the public benefit on a custodial basis in a natural state. The local District Manager says what we should do is write to you. We get the feeling that public imput isn't wanted if it runs counter to the timber quota directives handed down by your office to the local office.

9- And so we are writing. We are concerned locally with our own East Mendocino Planning Unit. But as you can tell we are equally concerned nationally. You may say the problem of setting aside land in a natural condition shouldn't be entirely on BLM's back. Perhaps it shouldn't, but because you are a late entry into the multiple use game you happen to have the most undisturbed land. However, as far as we are concerned, if you feel the job of setting aside undisturbed land should be shared by you with the National Forest System, we can see no objection. From your standpoint it is all Department of the Interior and should be able to be handled internally. The real question is the amount. It is a national disgrace for Congress to pass a bill creating a King Range National Conservation Area and then for BLM to finally designate 6% of it to be a wilderness area! It is a national disgrace that of the 1.9 million acres of timberland in Western Oregon which BLM manages, less that 9% of it is reserved for non-timber useage. And it is a local disgrace that there is practically no virgin undisturbed Douglas Fir forest land in Mendocino County that is not potentially available to the timber industry. BLM has a substantial part of the virgin country supporting delicate and in many cases unknown ecological relationships, supporting the last stronghold of the bear, the fox, the cougar, the bobcat and the eagle, supporting a large body of the public who can only feel really comfortable if they know that at least some of the land isn't going down the ruined Eel River into the ocean. But most of all a place where we and future generations can go to see it the way it once was.

What can you tell us, Mr. Berklund?

Sincerely,

Citizens Committee To Save
Our Public Lands
P.O. Box 597
Willits, Ca 95490

David Drell
David Drell, Secretary

DD:mb

Enclosure

cc:

Hon. Alan Cranston
Hon. Don Clausen
Mr. Mel Clausen
Governor Jerry Brown
Mrs. Claire T. Dedrick
Assemblyman Barry Keene

* * * * * * * * * * * * *

May 31, 1975

Resolution by Citizens' Committee To Save Our Public Lands

WHEREAS The Bureau of Land Management has asked for public imput and suggestions in the management of the public lands in the East Mendocino Planning Unit, and

WHEREAS The 13,100 acres of timberland proposed for logging represent some of the last virgin Douglas Fir and much of the surrounding area is undisturbed, and

WHEREAS This represents one of the public's last opportunities to create a unique natural heritage - a heritage of wildlife, of hunting in natural surroundings, of fishing in natural streams; a heritage of education for our scientists, botonists and naturalists; a heritage of beauty for the sightseer, camper and hiker, and

WHEREAS The 13,100 acres is a small part of the total area representing six-tenths of one per cent of the total acreage of Mendocino County and would fit into a five mile square parcel,

BE IT RESOLVED that the Bureau of Land Management permanently set aside in The East Mendocino Planning Unit the 13,100 acres of timber proposed as an opportunity for logging, and that these 13,100 acres be held for the public benefit on a custodial basis in a natural state.

Signed ____________________
Address____________________
City ____________________

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Citizens Committee to Save Our Public Lands
Willits, California 95490

Paragraph #	Response
1 through 9	As indicated in Chapter I(B), the Bureau of Land Management is charged with the responsibility for managing the national resource lands under the various acts cited. Inclusive is the responsibility to provide a mix (multiple-use) of natural resource values and uses based on the needs of society, and national goals and objectives. In responding to these obligations, the Bureau has implemented a land-use planning system which permits informed and objective multiple-use decision through identification and reconciliation of conflicting land and resource uses in advance of on-the-ground action. This planning system is described in Chapter I(C).

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July 3, 1975

Mr. Karl Bergsvik
Division of Forestry
Bureau of Land Management
18th and C Streets
Washington, D.C. 20045

Dear Mr. Bergsvik:

Enclosed please find comments of the Natural Resources Defense Council, Inc. on the Bureau's draft environmental impact statement on timber management.

We hope that these comments will prove useful, and look forward to the Bureau's response.

Sincerely,

Ballard Jamieson, Jr.

BJ/ak
Enclosure

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COMMENTS
OF THE
NATURAL RESOURCES DEFENSE COUNCIL, INC.
ON THE
BUREAU OF LAND MANAGEMENT
DRAFT ENVIRONMENTAL STATEMENT
FOR
TIMBER MANAGEMENT

Submitted by:

John D. Leshy
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I. INTRODUCTION

The Natural Resources Defense Council, Inc. (NRDC) submits these comments on the Bureau of Land Management draft environmental impact statement (EIS) on "Timber Management" (DES 75-10).[1]

We find the draft totally inadequate to inform the public and official decisionmakers about the environmental impacts of the ongoing major actions regarding timber management on the nation's public lands, and their reasonable alternatives. As such, the statement fails to comply with the National Environmental Policy Act of 1969 (NEPA).

While NEPA's requirements are by now widely known, it is useful to note the major obligations imposed by that statute on federal agencies such as the BLM. Section 102(2)(C) of NEPA requires, first that federal agencies study and disclose fully the environmental effects of proposed actions and alternatives to such actions; and second, that the agencies consider these effects and alternatives in their decisionmaking.

The purpose of an environmental impact statement is "to aid in the agency's decisionmaking process and to advise other interested agencies and the public of the environmental consequences of planned federal action."[2] As the court in *EDF v. Corps of Engineers*[3] noted:

> "*At the very least, NEPA is an environmental full disclosure law*. . . intended to make . . . decisionmaking more responsive and responsible. The detailed statement required by § 102(2)(C) should, at a minimum, contain such information as will alert the President, the Council on Environmental Quality, the public, and, indeed, the Congress to *all known possible* environmental consequences of proposed agency action."

And, in *NRDC v. Morton*,[4] the District of Columbia Circuit Court summarized the role of the impact statement as follows:

> "Congress contemplated that the Impact Statement would constitute the environmental source material for the information of the Congress as well as the Executive, in connection with the making of relevant decisions, and would be available to enhance enlightenment of -- and by -- the public. The impact statement provides a basis for (a) evaluation of the benefits of the proposed project in light of its environmental risks, and (b) comparison of the net balance for the proposed project with the environmental risks presented by alternative courses of action."

To meet the burden of full disclosure, an agency is required to "explicate fully its course of inquiry, its analysis, and its reasoning."[5]

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[1] NRDC is a non-profit environmental law organization which seeks, principally through administrative and legal proceedings, to promote environmental protection and the conservation of natural resources. NRDC has more than 25,000 members and contributors and offices in New York, Washington, D.C., and Palo Alto, California.

[2] *NRDC v. Grant*, 341 F. Supp. 356, 364 (E.D.N.C. 1972).

[3] 325 F. Supp. 749, 759 (E.D. Ark. 1971) (emphasis supplied).

[4] 458 F.2d 827, 833 (D.C. Cir. 1972).

[5] *Ely v. Velde*, 451 F.2d 1130, 1138 (4th Cir. 1971).

In addition, NEPA requires full consideration of this information in agency decisionmaking,[6] a balancing of the environmental costs and benefits of the proposed action,[7] quantification of environmental values,[8] a thorough discussion of the "overall cumulative impact of the action proposed . . . and further actions contemplated,"[9] and a thorough discussion of alternatives to the proposed program.[10]

None of these requirements is adequately met by the present draft. The draft statement fails completely to disclose the actual "on-the-ground" environmental impacts of the Bureau's timber management program. Its assessment of ecological effects generally is conducted on an abstract plane, and the information presented does not relate to specific forest areas on the public lands. Standing alone, the draft falls far short of the "environmental full disclosure" statement required by NEPA, and the Bureau is clearly required to prepare additional impact statements at the local level.

There is a role, however, for a national programmatic impact statement on timber management on the public lands. Such a statement is the appropriate place for a careful national, cost-benefit evaluation of the Bureau's entire timber management program. The costs of reforestation, of fire prevention, of insect and disease control, of lost fish and wildlife habitats and recreational opportunities, of erosion damage and other environmental costs should be weighed against the value of the timber produced. Such an analysis would provide a solid foundation for the presentation of national policy alternatives regarding the proper mix on the public lands of these often competing purposes.

Unfortunately, however, the draft fails to present the type of quantitative data needed for an adequate analysis of national options. It makes no attempt, for example, to quantify the cumulative impacts of alternative timber management activities, or the reduction of these impacts through the imposition of mitigating measures. Additionally, it neglects to consider the results of significant research and experimentation on alternative operational practices which could be instituted by the BLM.

In short, the draft statement serves neither as a substitute for individual impact statements prepared on the local level, nor as an adequate "programmatic" or "generic" EIS on the Bureau's timber management program. Its deficiences in each of these respects are more fully discussed below.

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[6] Calvert Cliffs' Coordinating Committee v. AEC, 449 F.2d 1109 (D.C. Cir. 1971).

[7] Id.

[8] NEPA, § 102(2)(B).

[9] CEQ Guidelines, 40 C.F.R. § 1500.6 (Aug. 7, 1973).

[10] NRDC v. Morton, 458 F.2d 827 (D.C. Cir. 1972).

II. THE BUREAU OF LAND MANAGEMENT IS REQUIRED UNDER NEPA TO PREPARE SPECIFIC IMPACT STATEMENTS REGARDING ACTUAL "ON-THE-GROUND" ENVIRONMENTAL EFFECTS, AND THE DRAFT STATEMENT ON TIMBER MANAGEMENT DOES NOT SERVE THIS PURPOSE

In the five and one-half years since NEPA's enactment, the Bureau of Land Management has prepared but one impact statement which focused on actual, "on-the-ground" environmental effects of timber management activities on the public lands.[11] The draft statement on timber management does not purport to assess these on-the-ground effects, however, or otherwise to 1- obviate the need to prepare specific statements at the local level. Indeed, it claims to serve only as a "foundation" for subsequent impact statements which "may be required for a timber management program on a state, district or individual forest basis." (Draft Statement at I-1)[12]

It is apparent that the draft statement offers very little of value to the public official or concerned citizen who is interested in a particular forest area, and the way in which 2- it is being managed by the BLM. In the first place, information concerning the characteristics of a specific area -- for example, the soils present, the number of streams, the number and types of endangered species -- is simply not presented in the draft statement. Nor is it possible to determine from the draft what basic management decisions have been made, or are under consideration, by the Bureau with respect to any particular area. There is no way to learn, for example, what portions of an area, if any, have been classified for commercial timber harvesting, what harvesting methods are contemplated, what mitigating measures will be required, 3- the number and location of logging roads which were evaluated by the Bureau in developing the management plan for the area. Finally, the draft provides no basis whatever for assessing the probable environmental impacts of timber management in specific forests, and it candidly states that its consideration of these impacts is limited to "the cumulative or total program context." (III-1)

According to the draft statement, the Bureau's crucial management decisions are made at the "field level," (I-17) and are often a function of the "conditions that characterize the site or stand." (I-3) It is clear, however, that the draft 4- statement will be of little, if any, use to Bureau personnel charged with deciding whether a particular forest area, or portions of it, should be harvested, and if so, in what manner and under what restrictions.

District personnel must determine, for example, when 5- clearcutting is appropriate, and the draft indicates that any such decision should be based on the following standard:

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[11] That statement concerned the Big Butte Timber Sale in Mendocino and Trinity Counties, California (DES 74-13), and, we understand, was prepared only because of a threatened lawsuit with respect to that particular sale. Clearly, it was not a part of an overall design to implement NEPA.

[12] Unless otherwise indicated, all page references are to the Bureau's draft environmental statement on Timber Management.

> "Clearcutting [is] not to be carried out on slopes where the potential for excessive erosion or mass wasting exists. Factors affecting slope stability which are to be considered include slope gradient, thickness of the soil mantle, character of the underlying rock, precipitation patterns, and the inherent strength of the soil. 6- If these factors appear to be critical other cutting practices are to be considered." (IV-7)

There is absolutely nothing in the draft, however, which would enable officials at the field level to determine whether "the potential for excessive erosion" existed in a given area. Specific information regarding "slope gradient", "thickness of the soil mantle" and other relevant factors is simply not presented in the draft statement. The data set forth is extremely general and is not related to specific forest areas within the Bureau's jurisdiction.

It is apparent from the foregoing that the draft statement cannot serve as a substitute for specific impact statements prepared at the local level. Indeed, the draft simply underscores 7- the urgent need for such statements and the inadequacy of the Bureau's efforts to assess the on-the-ground environmental effects of its timber management program thus far.

By describing the draft as a "foundation" for subsequent impact statements "on a state, district, or individual forest 8- basis," (I-1) the Bureau suggests that further impact statements prepared on the local level may be forthcoming. Unfortunately, it offers no assurances in this regard, and leaves to speculation

its plans, if any, for the preparation of such statements.

There is no doubt, however, that the Bureau is legally required to prepare these specific impact statements and that, standing alone, the "programmatic" approach is insufficient 9- under NEPA. These issues were decided in NRDC v. Morton, 388 F. Supp. 829 (D.C. D.C. 1974), a case involving the Bureau's livestock grazing management program.

In that case, plaintiffs sought a ruling that the BLM was required to prepare impact statements "dealing with the actual environmental impact" of livestock grazing on the public lands. 388 F. Supp. at 833. As here, the BLM had prepared a draft programmatic EIS for its entire livestock grazing program, 10- which was to serve "as the foundation for subsequent environmental analyses and for supplemental impact statements." 388 F. Supp. at 832-33. Plaintiffs argued that the programmatic EIS was inadequate under NEPA since "it fail[ed] to consider the individualized, 'on the ground' effects on local environments." 388 F. Supp. at 833.

The Court ruled that "the programmatic environmental impact statement prepared by the BLM, standing alone, is not sufficient to comply with the NEPA requirements" and that the Bureau was 11- required to assess "actual environmental effects" "in specific areas" through the preparation of individual impact statements. 388 F. Supp. at 841. The basis of the Court's ruling is instructive:

> "The purposes of an EIS were summarized by the court in Environmental Defense Fund v. TVA, 339 F. Supp. 806 (E.D. Tenn.), aff'd 468 F.2d 1164 (6th Cir. 1972) as follows:
>
>> 'The purpose of a section 102(2)(C) detailed environmental impact statement is (1) to aid the agency's decision-making process and (2) to advise the public of the environmental consequences of the proposed action. The requirement seeks to insure that each agency decision-maker has before him, and takes into account, all environmental impacts of a particular project. Only if this is done will the most intelligent, optionally [sic] beneficial decision be likely to result. Moreover, the detailed statement provides evidence that these factors have been taken into account. More importantly, it allows those removed from the decision-making process to evaluate and balance the factors on their own.'
>
> In the BLM grazing license program the primary decision-maker is generally the individual district manager and his staff who approve license applications. While the programmatic EIS drafted by the BLM provides general policy guidelines as to relevant environmental factors, it in no way insures that the decision-maker considers all of the specific and particular consequences of his action, or the alternatives available to him. The proposed EIS does not provide the detailed analysis of local geographic conditions necessary for the decision-maker to determine what course of action is appropriate under the circumstances.
>
> Additionally, the programmatic EIS does not allow those who are not part of the decision-making process to adequately evaluate and balance the factors on their own. While NEPA does not require public hearings, it does provide a formalized procedure for such citizen input. In the present case the public will have the opportunity to comment only on the programmatic impact statement . . . . [W]hen it comes to the actual implementation of the licensing permit program at the local level,

> there will be no opportunity for particularized input by state and local citizens. Even though the actual permits may be made public, that provides only information from the government to the citizens and does not allow information to flow from the citizens to the government." (Footnotes omitted) 388 F.Supp. 838-39.

In ordering the Bureau to prepare these specific impact reports, the Court left "questions of format" to the agency and indicated that it would be "initially within the BLM's discretion 12- to determine" the scope and number of impact statements to comply with the Court's ruling. In fact, the Bureau ultimately agreed to prepare impact statements on 212 geographical areas comprised of groupings of grazing program activity plans.

In the case of the Bureau's timber management program, there are a number of geographical units which would be appropriate for individual impact statements. Such statements could cover entire districts, portions of districts or groupings of program 13- activity plans. They might also be based on planning units and prepared in conjunction with the Bureau's management framework planning process. These planning units were established because common conditions within them made planning as a unit sensible. The same considerations would make the areas appropriate for impact statements.

There is no justification, however, for the Bureau's continuing failure to prepare impact statements on some geographi- 14- cal basis which provides for an assessment of the actual "on-the-ground" impacts of its timber management program. In view of the

Court's ruling in NRDC v. Morton, supra, it is imperative that the Bureau disclose in its programmatic statement the basis or level and timetable on which it will proceed to do so.

The draft statement also leaves unanswered other significant questions concerning the Bureau's overall effort to comply with NEPA. It states, for example, that draft environmental impact statements are currently being prepared for certain activities which are "partially timber management related" including the use of chemical toxicants, chemical pesticides, pesticide 15- container disposal and the fire management program. (2) The draft offers no explanation, however, for why these particular activities were singled out by the Bureau for separate consideration in an impact statement. Nor does it disclose whether the Bureau has determined not to prepare individual statements on any of its other timber management related activities, and if so, which such activities will not be separately considered.

At a minimum, the draft should set forth the criteria by which the Bureau determines whether these related activities constitute "major federal actions" under NEPA. It should also 16- indicate whether under these criteria the Bureau may prepare impact statements on some of the more important and controversial practices discussed in the draft statement.

The Bureau's "intensive timber management practices," for example, would appear to require separate analysis since, according 17- to the draft, they are considerably different than those now employed on the majority of the BLM's commercial timberland. (I-2,

3). Certainly the draft fails to address major environmental issues raised by such activities as reforestation with genetically improved trees, and the use of chemical herbicides and mechanical treatments for brush, weed and hardwood control. It does not specify what conditions favor the application of these practices, or what "technical, economic, and environmental constraints" (I-3) prohibit their use. It does not indicate what the total additional cost of implementing these practices will be, how that cost will be allocated between the federal government and private industry, and whether the Bureau will be able to obtain the necessary additional funds and trained personnel to oversee implementation of these intensive management practices. Does the Bureau intend to prepare a separate impact statement addressed to these crucial questions.

Finally, the basis of the Bureau's decision not to address its program activities aimed at "producing or providing other forest values" such as "recreation", "aesthetics", and "wildlife", 18- is not explained. (2) Which of these activities, if any, will be separately considered in an EIS, and which will not? By what criteria will the BLM determine whether these activities constitute "major federal actions" under NEPA?

It would be useful, in the discussion of the BLM's plans for implementing NEPA at all levels of its timber management program, for the Bureau to analyze and discuss the Forest Service's implementation of NEPA. The Forest Service provides, of course, the closest analogy to the BLM's timber management operations.

The agencies operate under similar laws and regulations requiring multiple use and sustained yield management of the various resources, and they manage lands in similar geographical areas throughout the West and Alaska, with similar species, conditions, and analogous management techniques. There are some differences between the two, mainly related to size and scope. The BLM manages 23 million acres of commercial forest land, mostly in Alaska. The calculated allowable cut is approximately 1.4 billion boardfeet of timber, of which most (85%) comes from the O & C lands in Western Oregon. The Forest Service manages some 91.9 million acres of public timberlands, nearly three quarters of which are in the Rocky Mountains and Pacific Coast. Approximately 12 billion board feet is harvested annually from these lands. Despite the obvious size differences, the similarities warrant a discussion of the Forest Service NEPA program.

Many consider that the Forest Service -- after early difficulties which prompted several successful lawsuits -- has done a good job at implementing NEPA, at least in fulfilling the Act's procedural requirement of an EIS on major federal actions.[13] Thus the Forest Service's application of, and experience under NEPA can serve as a useful model for the BLM.

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[13] See, e.g., the Council on Environmental Quality's generally laudatory discussion of the Forest Service's NEPA implementation at pp. 378-81 of the CEQ's Fifth Annual Report (December 1974). Copies of these pages are attached hereto as Appendix A. That is not to say the Forest Service's NEPA compliance is perfect, see, e.g., Wisconsin v. Butz, 7 ERC 1651, No. 74-C-304 (E.D. Wis. March 5, 1975).

The Forest Service prepares EIS's as a matter of course on its so-called "unit plans" -- land use plans which encompass environmentally similar areas which range in size from a few thousand to a several hundred thousand acres.[14] The Forest Service also prepares EIS's on single function or single resource management plans such as for timber management (usually done on a national forest basis), for such programs as herbicide use (usually done by national forest or groups of similar national forests), on such resource plans as five year cutting plans under long term contracts, and on particular timber sales contracts.[15] Finally, the Forest Service is preparing an EIS on its ten year overall management plan (Environmental Program for the Future). The BLM's implementation of NEPA of course pales by comparison.

IV. AS A "GENERIC" OR "PROGRAMMATIC" IMPACT STATEMENT, THE DRAFT IS SERIOUSLY INADEQUATE IN A NUMBER OF CRUCIAL RESPECTS

While a "generic" or "programmatic" impact statement on timber management can never serve the purpose of specific statements which assess on-the-ground environmental impacts, it nevertheless has an important role to play in the Bureau's overall NEPA compliance effort. This statement should serve two purposes. It should view environmental impacts nationally and ensure that they be seen on a cumulative basis, and it should relate the results of research and experimentation on alternative "operational practices" thereby avoiding duplication of this information from one local statement to the next.[16] Unfortunately, the draft statement serves neither of these purposes in its present form.

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[14] A description of the California Region Land Use Planning Process is attached as Appendix B.

[15] Attached as Exhibit C is a recent Forest Service quarterly report on Environmental Statements currently under preparation, (40 Fed. Reg. 17613, April 21, 1975) which lists several hundred EIS's currently in the drafting stage. Numbers of EIS's by themselves do not reflect all aspects of NEPA compliance; nevertheless, the number of Forest Service statements compared to the BLM is totally out of proportion to the size differences of the land managed by each.

A. The Draft Statement Makes No Attempt To Quantify Cumulative Environmental Impacts And Accordingly Provides No Basis For An Evaluation Of The Bureau's Timber Management Program, And Alternatives Thereto

While its stated objective is to describe environmental impacts "in the cumulative or total program context" (III-1), the draft statement makes virtually no attempt to quantify these 19- impacts and its analysis proceeds on an extremely general, abstract plane. As a result, it provides no basis for criticizing or otherwise commenting on the BLM's timber management activities, and the feasible alternatives to these activities.

For example, NRDC is particularly concerned about the 20- practice of clearcutting on the public lands. It was our hope that the draft statement would attempt, at least in approximate terms, to quantify the environmental impacts of this and other alternative harvesting methods on BLM-managed lands. With this type of information in hand, we could have addressed our comments to the appropriateness of the BLM's decision to approve clearcutting as the "major" harvesting practice on the public lands. (I-2)

The only quantified data disclosed in the draft, however, concerns the amount of acreage which is clearcut each year (19,000) and the location of this acreage (17,500 acres in northwestern 21- Oregon and 1500 acres in southwestern Oregon). (III-3) Beyond this, the draft deals only in generalities.

Consider, as one illustration, the draft's treatment of the impact of clearcutting on soils:

> "Clearcutting of 20,000 acres annually will expose the soil to erosive forces, particularly water, and increase the potential of landslides on non-cohesive soils." III-28.

The draft's analysis of the impacts of clearcutting on water quality is similarly vague:

> "Clearcutting of approximately 20,000 acres annually. . . cause[s] removal of forest cover which exposes natural water surfaces to continuous, direct solar radiation. . . An increase in maximum stream temperatures from about 50°F before clearcutting and burning to about 85°F afterward has been observed. . . Clearcutting on steep slopes in areas of shallow soils and heavy precipitation can cause, after several years, mass soil movement, resulting in sedimentation and degradation of water quality. . ." (III-42)[17]

This type of information is in all candor practically useless to members of the public, or citizen groups, trying to assess the environmental costs of clearcutting. It also seems 22- unlikely that this information could be of much use to officials within the BLM who may be responsible for evaluating clearcutting, and its alternatives, on a program wide basis.[18]

Rational evaluation of alternatives to the Bureau's present policy with respect to clearcutting is clearly impossible in the absence of quantified data which can be used as a basis of comparison. The draft attempts, for example, to examine the option of phasing out the clearcutting method in favor of a "partial or shelterwood cutting system." (VIII-29) The elimination of clearcutting would, according to the draft, reduce the impact of the Bureau's program on "aesthetic values", (VII-29) virtually "eliminate the burning of logging debris" (VIII-31), reduce the 23- "leaching of soil nutrients. . . due to increased litter on the forest floor" (VIII-32) and generally "lessen" the impact of timber harvesting on the forest ecosystem. (VIII-31) On the other hand, the draft indicates that exclusive reliance on partial or shelterwood cutting would accelerate the degradation of water quality (VIII-32), increase "the rate of the destruction of wilderness-type values" (VIII-34), reduce the total population of terrestrial wildlife (VIII-34), and lead to "some economic dislocation" for the timber industry. (VIII-35)

Even assuming that the draft's assessment of this particular alternative is accurate, the general nature of its analysis makes any comparison of shelterwood cutting with clearcutting a useless exercise. It is simply impossible to weigh, in any meaningful 24- sense, unquantified benefits to "aesthetic values" against unspecified costs in terms of a general reduction in the population of terrestrial wildlife, or "some economic dislocation" for the logging industry.

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[16] This role for the programmatic impact statement has been recommended by the President's Council on Environmental Quality, the federal agency responsible for impact statement procedures. See CEQ Guidelines, 40 C.F.R. § 1500.6(d)(1).

[17] While these quotations refer only to soils and water quality, they typify the vague and general terms used by the draft to describe the environmental impacts of clearcutting on the public lands. For other examples, see the discussion of clearcutting impacts on physiography, geology and minerals (III-22), on air and microclimate (III 50-51); on terrestrial vegetation (III 54-55); on aquatic vegetation (III 60-61); on terrestrial wildlife (III-66); and on aquatic wildlife (III-73-74). It is, moreover, clear that the draft's treatment of clearcutting is illustrative of its entire approach to describing the environmental impacts of the Bureau's timber management program. See generally Chapter 3.

[18] In fact, it is not at all clear from the draft that anyone within the BLM is responsible for evaluating clearcutting, or any other "operational practice", on a program wide basis. The draft does set forth certain general "major objectives and policies", including, for example, that the public lands "be managed so as to achieve a high level of regular periodic output without impairment of their inherent productivity or quality." (I-15) From all that appears in the draft, however, this objective is implemented exclusively by district personnel through land use decisions made in accordance with the Bureau's planning procedures, and the BLM's timber management program emerges "from the botton up" as the aggregate of these decisions at the local level.

Does the Bureau in fact establish substantive policies which apply generally to its timber management activities? For example, does it set maximums on the amount of land which can be clearcut each year, identify specific conditions which make clearcutting inappropriate, or specify precisely what types of mitigation measures must be required when clearcutting is approved?

The draft should state whether these kinds of decisions are made in Washington, or only at the district level. In appropriate cases, the public may wish to urge the BLM to evaluate its practices on a program wide basis, and to establish standards of general applicability, if it hasn't already done so.

An attempt must be made to quantify the cumulative environmental effects of the Bureau's timber management activities, of alternative timber practices, and of feasible mitigating measures.[19] The draft should, for example, provide estimates of the total soil and wildlife loss attributable to the Bureau's approval of clearcutting as the "major" timber harvesting method on the public 25- lands. It should state the number of streams and rivers which have experienced a decline in water quality as a result of clearcutting, and in each instance indicate how serious this decline has been. It should further describe quantitatively how successful the Bureau has been in mitigating these impacts by requiring buffer strips, for example, or prohibiting stream crossing during logging operations.

On the other hand, the draft should describe in quantitative terms the additional adverse impacts on water quality, the additional loss in aesthetic values, the incremental reduction in 26- wildlife population and the economic dislocation to the industry which conversion to a shelterwood system would likely entail. This type of information is absolutely essential for any meaningful "cost-benefit" comparison of alternative timber practices.

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[19] It should be noted that NEPA also requires the Bureau to place an economic value on the environmental resources affected by its timber management program. See note 8, supra. Failure to put a price tag on aesthetic values, on recreational opportunities, or on the preservation of endangered species has often contributed to their loss vis-a-vis resources, such as timber, with a clear dollar value. For one attempt to quantify the value of wildlife on the public lands, see Public Land Law Revision Commission, Background Studies, Vol. 2, p. 211.

This is not to suggest that quantifying the environmental effects of alternative timber practices will be easy. But surely the BLM has at its disposal the means to generate specific data on these effects, at least on certain limited areas, and to use this information in drawing conclusions with respect to the cumulative impacts of these practices on a program wide basis.

These practices have after all been widely employed for a number of years, and forest areas previously harvested would appear to be the logical starting point for an analysis of their environmental impacts. An assessment of timber harvesting in these areas would undoubtedly provide the Bureau with a wealth of specific quantifiable information on environmental impacts. Additionally, "predictive methodology" has been developed for estimating the effects of timber operations on the public lands. The Universal Soil Loss Equation, for example, is one of several methods used for estimating the amount of erosion caused by timber harvesting in specified circumstances. See "Processes, Procedures, and Methods To Control Pollution Resulting From Silvicultural Activities", United States Environmental Protection Agency (1973) at 73-77. The draft could make use of this and other predictive methods to provide, at least in approximate terms, quantified data on environmental impacts.

B. The Draft Fails To Relate The Results Of Research And Experimentation On Alternative Timber Practices.

A programmatic statement should also describe, in reasonable detail, the studies and experiments bearing on alternative operational practices available for the Bureau's timber management program. Such information would be of immense value to officials at the district level responsible for selecting among these 27- alternatives on a day-to-day basis. Similarly, those monitoring decisions made by Bureau personnel would clearly profit from a thorough-going analysis of alternative harvesting practices. Finally, by including this type of information in the programmatic statement, the Bureau would avoid duplication of the material in impact statements prepared at the local level.

Unfortunately, however, the draft's analysis of alternative operational practices is superficial and virtually ignores the wealth of relevant research and experimentation. To take one example, the draft indicates that "area burning" is conducted on 9,000 acres in western Oregon each year to prepare these lands for reforestation. (I-32). The draft concedes that area burning 28- has numerous adverse environmental effects which include the depletion of plant nutrients, an increase in surface water runoff and erosion, significant increases in stream temperatures (III-34), contamination of water courses with ammonia and manganese (III-34) and air pollution (III-48). Accordingly, the draft recommends a number of measures for the mitigation of these effects, including the application of mulch after area burns on critical sites (IV-6).

However, the draft statement simply ignores the results of experimental studies indicating that area burns may not even be required to prepare cutover lands for reforestation. One such study was conducted by the United States Navy in the Puget Sound 29- area and its results are reported in "Processes, Procedures and Methods to Control Pollution Resulting From Silvicultural Activities" published by the U.S. Environmental Protection Agency. Rather than burn the slash remaining after clearcut operations, the Navy bunched or piled it in windrows by using a crawler tractor equipped with a brush blade. (at 50).

The Navy found that the windrowed slash deteriorated more quickly than anticipated, and that soil particles mixed with the 30- slash supported "thrifty" Douglas Fir seedlings. Windrowing eliminates air pollution and "checks" erosion, according to the Navy, and "has proven successful beyond any doubt." (pp. 53-54).

It is precisely this type of information which should be 31- presented in detail by the Bureau's programmatic statement. The draft's failure to provide this information even with respect to its most controversial timber practices is simply inexcusable.

C. The Draft Leaves Other Important Questions About The Bureau's Program Unanswered.

The draft statement neglects to provide other important information concerning the Bureau's timber management program. 32- One such deficiency is its failure to analyze the process by which the mitigating measures described in Chapter 3 are implemented on the ground. The draft states only that

> "The effectiveness of all of the measures described in this section is dependent upon sound planning, adequate manpower and funding coordination with other resource activities, professional expertise, careful on-the-ground administration and cooperation from the contractor or user." (IV-1).

Since the successful implementation of these measures is of obvious concern to the public, the draft should spell out in reasonable detail how this is done.

The draft indicates, for example, that a number of measures
33- are taken to mitigate the adverse effects of clearcutting on water quality including

> "Providing streamside buffer strips of adequate width and density to reduce or eliminate sediment-laden overland flow from reaching stream channels. All perennial streams and those streams which carry water during peak runoff seasons are to have buffer strips. Buffer strips are to contain enough trees and shrubs to provide shade for the stream and protection for the stream bank. The width of the buffer strip necessary to meet these objectives will consider the slope of the ground into the stream channel; topographic shading; tree height, density, and species; stream characteristics (width, depth, and flow velocity); and the erodibility of the soil." (IV-22).

Who determines how wide a "buffer strip" must be and what objective criteria, if any, does he use in making this determination? Are these criteria in the form of written Bureau directives?
34- Do field personnel inspect the area to be harvested, or do they merely consult relevant texts such as the soil survey, or rely on information provided by the timber operator?

Once the Bureau decides how wide the buffer strip along a particular creek should be, how does it insure that the strip will in fact be preserved by the timber operator? The draft suggests that contractual provisions may provide for these buffer
35- strips. (I-29). Is this the case? If so, how often is the timber operation inspected for compliance with these provisions, and what happens when violations are found? How many contractual violations were reported last year?

As a general matter, does the Bureau believe it has adequate manpower and sufficient funding to accomplish the "careful on-the-ground administration" required for implementation of these mitigation measures? Are additional resources needed by
36- the Bureau to compile and analyze data for the formulation of appropriate mitigation measures? Does the Bureau have sufficient personnel to insure that these measures, once formulated, are in fact implemented?

In this connection, a serious defect in the draft is its failure to set forth the budget under which the BLM operates its timber management program. A description of how the budget is developed, and recent years' appropriations and appropriations requests, by functional category (research, timber management,
37- recreation, wildlife, firefighting, insect and disease control, etc.) is vital to place in perspective the basic management options which must be considered. Decisionmakers both within and without the Department of the Interior need such information to enable them to evaluate the effectiveness with which the proposed program,

and its alternatives, could be implemented, as well as the likelihood that sufficient funds may be forthcoming to reach the desired level of management in particular categories.

CONCLUSION

Five and one-half years have passed since NEPA became effective. The BLM's failure to effect a thorough implementation of that statute with respect to its timber management program is both unwise and illegal. An adequate programmatic EIS could signal the beginning of compliance by (a) outlining the overall effects, costs, and benefits of, and alternatives to its timber management program; and (b) establishing a clear and precise framework for the preparation of more site-specific EIS's on particular geographic areas.

This draft does neither. We recommend institution of a crash program to rewrite the present EIS, correcting the major defects noted herein, and releasing a new draft as soon as possible. At the same time, work could proceed on one or more site-specific EIS's to serve as a model for future such statements, much as the BLM is now proceeding to prepare such an EIS on a grazing district to serve as a model for the other statements required to comply with NRDC v. Morton, supra.

NOTE TO READER:
Appendices A, B and C submitted with the National Resources Defense Council comments are available for public inspection by contacting:

Bureau of Land Management
Division of Forestry (340)
18th and C Sts., N.W.
Washington, D.C. 20240

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Natural Resources Defense Council, Inc.

Paragraph #	Response
1 through 14	Since publishing the draft environmental impact statement, the Bureau has determined that it will be necessary to prepare environmental impact statements (EIS's) covering the thirteen sustained-yield units in western Oregon. These EIS's will be prepared in accordance with the National Environmental Policy Act, publicly circulated, and considered in the decisionmaking process. This information, including a time-schedule for completing each of the EIS's, is included in Chapter I of the final EIS. In addition to the above, the Bureau is currently reviewing the timber management programs for each of the 17 sustained-yield forests outside western Oregon to determine whether the timber management program in each unit constitutes a major Federal action significantly affecting the human environment, thus requiring an environmental impact statement. To date, these reviews indicate that environmental impact statements will be necessary for the Coeur d'Alene District, Idaho and the Ukiah District, California forest management programs. The Bureau will also continue its policy of requiring a site-specific environmental analysis record (EAR) on each timber management action, i.e., timber sale, reforestation project, thinning contract, etc. The EAR, among other things, will provide the responsible official with sufficient, detailed information to determine the need for an environmental impact statement on a specific project.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
15	The final environmental statement fully addresses only those activities which are a part of or entirely supportive of the timber management program. Since the use of chemical pesticides and the fire management program are also supportive of other Bureau resource management programs (e.g., grazing, recreation, wildlife), a decision was made to discuss and analyze the use of chemical pesticides and fire management in separate environmental statements (thus, only discussed briefly in Timber Mangement ES). Subsequently, the Bureau has determined that a programmatic environmental statement concerning the use of chemical pesticides will not be prepared. Instead, each proposed chemical pesticide project will require a detailed and comprehensive environmental analysis and, as determined necessary, an environmental statement.
16 and 17	The intensive timber management practices discussed in the final environmental statement are not "considerably different than those now employed on the majority . . . " as indicated in your comment. The majority of those practices described in the environmental statement (see Chapter I(E), Forest Operational Practices) are currently being used in the timber management program. Further, any radical departure from these operational practices including, for example, an expanded fertilization program would require further site-specific environmental analysis.
18	In preparing the Timber Management environmental impact statement, the Bureau addressed itself specifically to the timber management program, e.g., those activities which enhance and accelerate the growth of trees; thereby permitting a high, sustained-yield level of forest products from those lands determined available for timber production. The purpose of the environmental statement was not to engage in lengthy discussions of inventory procedures, the Bureau Planning System or forest management as a whole. Thus, determining the need for EIS's on program activities such as recreation, aesthetics, wildlife, etc., is considered beyond the scope and intent of the Timber Management EIS.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
19 through 26	Because of the diverse environmental situations encountered, we believe that quantification of certain impacts as suggested may result in gross miscalculations. Further, these quantified impacts distributed program-wide would be of little value and may be highly misleading to the reader. The final EIS, therefore, maintains a format of describing environmental impacts in general, comparative terms (refer to Summary Tables III-2, V-1, and VIII-1). More specificity, however, particularly in quantifying environmental impacts, will be required in the EIS's prepared covering the sustained-yield units in western Oregon and for the Coeur d'Alene District, Idaho and Ukiah District, California. Further, it was not the intent of the timber management environmental statement to evaluate only clearcutting but, rather, it was intended to describe the Bureau's timber management activities on a program-wide basis and the probable environmental impacts resulting therefrom. We believe the final environmental impact statement adequately accomplishes this objective. Additionally, quantified impacts (in qualitative terms) of various silvicultural practices have been included in Tables III-2 and V-1 of the final environmental statement. Also with regard to clearcutting, the Bureau has not made any arbitrary decision relating to the amount of Bureau forest land that can be clearcut annually. Bureau policy concerning clearcutting is in accord with the guidelines provided in the Report by the Subcommittee on Public Lands on Clearcutting on Federal Timberlands. Further, "standard" mitigative measures used with clearcutting can only be described in general terms since mitigating measures needed are not necessarily a function of the harvesting method but, rather, are related to the specific topography, climate, soils, site quality, aesthetics, regenerative capacity and a multitude of other environmental conditions.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
19 through 26 (Continued)	The Bureau of Land Management will not prepare a cost-benefit analysis of this proposal and the alternatives in this statement. The Department of the Interior and, correspondingly, the Bureau of Land Management prefer not to utilize an environmental impact statement or analysis as the decisionmaking document. Rather, it is designed to display the environmental "costs" of a proposal for consideration of the decisionmaker. For this reason, cost-benefit justification data are not included in this document.
27 through 31	We believe the programmatic environmental statement adequately discusses the relevant operational practices which will be employed in the Bureau's timber management program. The practices described in Chapter I(E) provide the responsible field officials with a variety of silvicultural practices, logging methods and protective measures to meet local and site-specific situations. Further, we do not believe the programmatic environmental impact statement, covering timber management programs in 12 western states and nearly 23 million acres of commercial forest land, is the appropriate document for detailed discussions relating to specific methods of slash disposal. The EIS does, however, discuss in general terms several optional methods of slash disposal including scarification which permits piling of debris for burning, decomposition or disposal by burying. We believe the decomposition method parallels the U.S. Navy method in which "the Navy bunched or piled it in windrows by using a crawler tractor equipped with a brush blade." Further, we caution citing such studies without qualification since the implication is that the Navy method could replace burning as a disposal method. On the contrary, the Navy slash disposal project was conducted on moderate slopes (up to 25%). Operations on steeper slopes, more characteristic of BLM lands, could have significant and long-lasting impacts on the environment. Nevertheless, methods such as those demonstrated by the Navy do have practical application in the Bureau's timber management program. Their use, however, should more appropriately be determined through a rigorous analysis of alternatives for a specific project. This analysis is a primary function of the environmental analysis record prepared for each timber management action.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
32 through 35	As specified in the introductory paragraph of Chapter IV, mitigative measures will be carried out in the course of planning a practice (or action) and in executing it through contract stipulations and contract administration. Operational Practices, Chapter I(E) states that "the practices that are included in a timber management program are subjected to detailed operational planning, evaluation and layout. This requires on-the-ground activities conducted by Bureau personnel prior to the action being taken, such as field reconnaissance and data gathering, delineating the area to be planted, marking the trees or stands to be harvested, . . . etc." The field reconnaissance and data gathering phase permits the planner(s) to formulate a project proposal and, subsequently, prepare an environmental analysis record (EAR) for the proposed action. This analysis may be prepared by an interdisciplinary team, reviewed by an interdisciplinary team, or both depending on the project and level of intensity required in preparing the EAR. Through this interdisciplinary process, the recreationist, wildlife biologist, fisheries biologist, range specialist, hydrologist and other disciplinary experts can determine the adequacy of, among other things, the mitigative measures which will be used to protect the various resources and to suggest or include additional protective measures. Thus, decisions such as how wide must a buffer strip be are determined through the use of site-specific field information (i.e., soils, vegetation, topography, etc.,) and recommendations from the various resource experts. On-the-ground protection for the buffer strip, for example, may be afforded by posting or specifically identifying the trees or area to be excluded from timber harvesting activities. Such protective measures may also be duly noted in the contract or attachments thereto. A sample completed timber sale contract is included as Appendix B in the final EIS.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
32 through 35 (Continued)	Chapter I(E) states that "the stipulations contained in the contract set forth the standards and specifications to be followed by the contractor in carrying out the action in accordance with Departmental and Bureau regulations and policies. These stipulations specify the measures to be followed or taken in accomplishing the action and the manner in which it is to be performed in order to minimize or eliminate its impact on the environment." This same section further states that "the contract is administered through inspections by qualified Bureau personnel, usually once each week, to insure compliance to its (contracts) intent and terms contained therein." Contract inspections may be made more or less frequently than that indicated depending upon the type of project, level of contract activity and the time of year. Failure to comply with the provisions of a contract are specified in the contract and the Secretary's regulations pertaining to the disposal of forest products. Section 10 of the timber sale contract (Appendix B), for example, specifically discusses Violations, Suspensions, and Cancellation. Further, it is our opinion that a compilation of contractural violations not accompanied by a lengthy and rigorous analysis of these violations would be of little value and, likely, would be grossly misleading. Contract violations may range from "minor" offenses, such as littering, to "major" offenses, such as timber trespassing. "Lumping" these violations into a single category would be erroneous and would serve little purpose in determining the effectiveness of contract provisions and the administration thereof.
36	Generally, the Bureau has adequate manpower and sufficient funding to accomplish effective administration of the mitigative measures pertaining to the timber management program. From time to time, however, changes in national priorities and goals and/or budget constraints temporarily necessitate shifts in the timber program emphasis. Within the existing framework of laws and regulations, however, environmental protection and enhancement will not be subordinated to other timber program objectives.

Natural Resources Defense Council, Inc.
(Continued)

Paragraph #	Response
37	In the Bureau's judgment, detailed discussion of the Bureau's budget process is not appropriate for inclusion in an environmental impact statement which focuses on timber management activities. The EIS does, however, indicate that the cost of carrying out the program is approximately $20 million annually and that the value of timber sold in 1975 was $191 million dollars. For further information regarding the BLM budget, we suggest consulting the appropriate (fiscal years) United States Department of the Interior Budget Justifications for the Bureau of Land Management.

FEC

FAIRBANKS ENVIRONMENTAL CENTER
Box 1796
Fairbanks, Alaska 99707
(907)-452-5312

James E. Kowalsky, *Director*

10 April 1975

Director (220)
Bureau of Land Management
18th and C Streets, NW
Washington, D.C. 20240

RE: TIMBER MANAGEMENT DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Sir:

We have reviewed your draft environmental impact statement for Timber Management and offer the following comments in this regard.

1- Apparently because of a low rate of exploitation in interior Alaska forests, you have chosen an essentially non-management option except for fire protection and suppression measures. Given Alaska's increasing population and access to presently remote areas, we wonder if this low rate of commercial exploitation will continue?

2- Secondly, in your discussions of the biological environment, fire suppression measures, and wildfire, you have neglected to consider the ecological signficance and positive aspects of wildfire. Nor have you considered the impact on the environment of the absence of naturally-occuring wildfires. I suggest that you consult a very useful summary of some of these considerations: Viereck, Leslie A., 1973, Wildfire in the Taiga of Alaska, Journal of Quaternary Research 3:3:465-95.

3- The commercial exploitation of interior Alaska timber may be low, but the value and use of interior Alaska forest lands for recreational and wildlife purposes is increasing tremedously. Lands whose primary value is recreation and wildlife are presumeably to be maintained in a natural state. An environment in which fire is continually suppressed by artificial means is not "natural". Your final environmental impact statement should address the role and value of fire in the forest ecosystem as well as the impact of the absence of natural wildfires in the forest ecosystem.

4- In short, we suggest that BLM reevaluate its intention to continue its fire suppression programs in interior Alaska. Thank you for considering our views.

Sincerely,

Stan Senner
Stan Senner
Special Projects Director

enclosure: abstract from Viereck article referenced above

'Gateway to the Arctic'
(100% Recycled Paper)

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Fairbanks Environmental Center
Fairbanks, Alaska 99707

Paragraph #	Response
1	As indicated in the final environmental impact statement, the Alaska Statehood Act and the Alaskan Native Claims Settlement Act will continue to influence the Bureau's ability to manage public lands in the State of Alaska for several years. Once adjudication has settled land tenure issues, however, the Bureau will take a more positive role in managing the public resources in Alaska. Future management programs will consider all resource values, uses and needs. "Commercial exploitation" will, therefore, only be permitted under multiple-use principles that are in the best interest of the public.
2, 3, and 4	The Bureau is currently preparing a programmatic environmental impact statement on the Bureau's fire management program. Reference materials such as Fire in the Northern Environment and Wildfire in the Taiga of Alaska are valuable sources of information and will be listed in the bibliography of the Fire Management environmental impact statement. Additionally, this same document will discuss the beneficial and adverse impacts on the environment, including recreation and wildlife resources, caused by artificial suppression of wildfire. Based on this analysis, the responsible Bureau officials can make better informed decisons relative to the continued use of fire suppression activities in Alaska and other regions.

OREGON ARCHAEOLOGICAL SOCIETY

P.O. BOX 13293
PORTLAND, OREGON 97213

June 9, 1975

Director (340)
Bureau of Land Management
Washington D.C. 20240

Dear Sir:

In reference to Timber Management: A Draft Environmental Statement, dated January 1975, No. 1792 (911), we wish to comment on archaeological impact. Generally, we feel the statements dealing with archaeological resources indicate your concern for preserving and protecting archaeological sites and we appreciate this concern.

However, we find your statements far too general. We would like to see a specific and comprehensive plan for archaeological preservation outlined in your final statement. Some questions we might pose for your consideration in formulating such a plan would be: Will you be operating from a current
1- archaeological survey for the areas covered by your environmental statement? If not, would such a survey be conducted prior to any land-altering operation or operations suggested in your proposal? How do you define an archaeological site? How do you propose to afford protection from vandalism for sites that may be encountered? Are private contractors to be made aware of their responsibility to protect or salvage sites on Federal Land?

We are well aware of the vast areas covered by this statement and the diversity of types of archaeological sites you could encounter. You are faced with a staggering task in attempting to evaluate and preserve sites over such a wide territory. We do urge you to develop a more concrete plan to approach the task.

Thank you for permitting us to review this statement.

Sincerely yours,

Henry Sjoblom

Henry Sjoblom, President
Oregon Archaeological Society

Copy to:
Mr. E. J. Petersen
Acting State Director
Bureau of Land Management
Portland, Oregon 97208

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Oregon Archaeological Society
Portland, Oregon 97213

Paragraph #	Response
1	Chapter IV, Mitigating Measures, has been expanded to include the process by which the Bureau will insure that archaeological sites will be identified, evaluated and protected. This includes special timber sale contract provisions which will make the operator (contractor) aware of his responsibilities as they pertain to cultural resources. With respect to definition of archaeological site, cultural and historic resources, etc., please refer to the glossary which has been included in the final environmental impact statement.

OREGON ENVIRONMENTAL COUNCIL
4315 S.W. CORBETT AVENUE, PORTLAND, OREGON 97201 / PHONE: 503/222-5369

AMERICAN ASSOCIATION OF UNIVERSITY WOMEN, Portland Branch
AMERICAN INSTITUTE OF ARCHITECTS
The Portland Chapter
Southwestern Oregon Chapter
AMERICAN INSTITUTE OF PLANNERS
Oregon Section
AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
Oregon Section, PNW Chapter
ANGLERS CLUB OF PORTLAND
BAY AREA ENVIRONMENTAL COMMITTEE
Coos Bay, Oregon
CHEMEKETANS, Salem, Oregon
CITIZENS FOR A CLEAN ENVIRONMENT
Corvallis, Oregon
CLACKAMAS COUNTY NEW POLITICS
CLATSOP ENVIRONMENTAL COUNCIL
COMMITTEE FOR VOLCANIC CASCADE STUDY
Portland, Oregon
COMMITTEE FOR MINAM ACTION, INC.
Portland, Oregon
ENVIRONMENTAL ACTIVIST COALITION
Lewis and Clark College
EUGENE FUTURE POWER COMMITTEE
EUGENE NATURAL HISTORY SOCIETY
4-H CLUB CARROT-TOPPERS, Scappoose, Oregon
FRIENDS OF THE EARTH
GARDEN CLUBS of Cedar Mill, Corvallis, Gervais, Illinois Valley, McKenzie River, Scappoose
GREENLEAF CLUB OF FIRST UNITARIAN CHURCH
Portland
INSURANCE WOMEN'S ASSOCIATION OF PORTLAND
JUNIOR LEAGUE, Eugene, Portland
McKENZIE FLYFISHERS, Eugene, Oregon
McKENZIE GUARDIANS, Blue River, Oregon
NORTHWEST STEELHEADERS COUNCIL OF TROUT UNLIMITED, Beaverton, North Portland, Portland, Tigard
OBSIDIANS, INC., Eugene, Oregon
OREGON CITIZENS FOR CLEAN AIR
OREGON COUNCIL FOR NEW POLITICS
OREGON COUNCIL OF ROCK AND MINERAL CLUBS
Roseburg, Oregon
OREGON GUIDES AND PACKERS, Vida, Oregon
OREGON NURSES ASSOCIATION
OREGON PARK & RECREATION SOCIETY
Corvallis, Oregon
OREGON SCIENCE TEACHERS ASSOCIATION
OREGON SOCIETY OF LANDSCAPE ARCHITECTS
Portland, Oregon
OREGON TUBERCULOSIS AND RESPIRATORY DISEASE ASSOCIATION
O.S.U. FIN AND ANTLER CLUB
Corvallis, Oregon
O.S.U. MOUNTAIN CLUB, Corvallis, Oregon
PLANNED PARENTHOOD ASSOCIATION, INC.
Lane County, Portland
PORTLAND AUDUBON SOCIETY
P.U.R.E., Bend, Oregon
REED COLLEGE OUTING CLUB
Portland, Oregon
ROGUE ECOLOGY COUNCIL
Ashland, Oregon
SALEM BEAUTIFICATION COUNCIL
SANTIAM ALPINE CLUB
Salem, Oregon
SIERRA CLUB
Pacific Northwest Chapter
Columbia Group, Portland, Oregon
SPENCER BUTTE IMPROVEMENT ASSOCIATION
Eugene, Oregon
TRAILS CLUB OF OREGON
TROUT UNLIMITED
UNIVERSITY OF OREGON OUTDOOR PROGRAM
Eugene, Oregon
WILLAMETTE RIVER GREENWAY ASSOCIATION
WILLAMETTE TUBERCULOSIS AND RESPIRATORY DISEASE ASSOCIATION, Salem, Oregon
WOMEN'S ARCHITECTURAL LEAGUE OF PORTLAND
ZERO POPULATION GROWTH
Lane County, Portland

Director
Bureau of Land Management
Washington, D.C. 20240

re: DES 75-10, Draft Environmental Statement
for Timber Management

Dear Sir

Please consider the comments in this letter in preparation of the final BLM timber management environmental impact statement.

I have reviewed the draft environmental impact statement and am of the opinion that it is not sufficiently detailed and specific to be a useful decision-making tool. The
1- primary problem is that the statement purports to deal with timber management programs in Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Utah, Washington, and Wyoming.

It is probably impossible to prepare an adequate one volume impact statement for such a large and varied area. The authors of the statement acknowledge the problem by their comment on page 1 that it will serve as a "foundation and framework for subsequent environmental analyses and statements which may be
2- required for a timber management program on a state, district or individual forest basis." I applaud the statement and I hope that the Bureau will in fact prepare environmental impact statements for each individual forest. I would also hope that these individual impact statements will consider forest uses other than timber management.

The Bureau appears to be committed to cutting the maximum possible amount of timber from its western Oregon holdings. This is evidenced
3- by the fact that timber is being cut at the rate 1.172 billion board feet per year from an inventory with a growth rate of 360 million board feet

Comment of the Oregon
Environmental Council
page 2

per year. It is further evidenced by the fact that the Bureau plans to cut the old growth in western Oregon, over half the inventory, within 25 years. (see pages I-1 through I-5). The data in the impact statement are inadequate to show that such a cutting schedule is consistent with sustained yield forestry.

Apart from the issue of questionable timber management, I object on my own behalf and on behalf of the Oregon Environmental Council to the deliberate destruction
4- of old growth timber. Such logging practices are sometimes justified with the argument that old growth is "overmature." The term is used to conceal base motives. It is more lucrative to cut old growth than it is to cut younger timber.

On other occasions the accelerated destruction of old growth timber is defended with the allegation that
5- there is a shortage of lumber. Nothing could be further from the truth. Wood and wood products are so cheap that they are the major component of our urban landfills.

The actual reasons for maximum timber production are admitted on pages VIII-43 and VIII-44. Maximum
6- production is necessary to to hold the price of wood and wood products to a minimum, for if their price increases substitute materials become economically attractive.

James H Conley

James H. Conley
for the Oregon
Environmental Council

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Oregon Environmental Council
Portland, Oregon

Paragraph #	Response
1 and 2	Since issuing the draft statement, Timber Management, the Bureau of Land Management has determined that it will be necessary to prepare separate environmental impact statements covering the sustained-yield units in western Oregon. These impact statements will encompass over 50% of the Bureau's lands currently available for timber production (excludes Alaska) and 92% of the volume harvested annually. Environmental impact statements will also be prepared for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California (see Chapter I(D) for schedule).
3	As indicated in Chapter I, Section A, the current allowable cut plan for western Oregon precludes timber harvesting on 157,000 acres and stipulates that special cutting practices be carried out on 154,000 acres. Most of these lands support old-growth timber which will be left to die of natural causes. Consequently, Bureau plans do not call for the harvest of all old-growth timber. The fact that the annual allowable cut is three times the annual growth does not, in itself, support the contention that the Bureau is committed to cutting the maximum amount of timber. The reason for the difference, as pointed out in the final environmental impact statement, is that most of the overmature stands, which characterize BLM lands, have negative growth rates because annual mortality exceeds the annual growth of wood on the surviving trees. The printouts from the computerized simulation model used in developing the allowable cut plans for western Oregon show that the gap between the annual cut and annual growth progressively closes over approximately a 70-year period at which time they will be the same, i.e., 1.172 billion board feet. The narrative in Chapter I, Section A, has been changed to more fully explain this relationship.

Oregon Environmental Council
(Continued)

Paragraph #	Response
4	The primary purpose for assigning a high priority to the cutting of old-growth stands is to minimize the risk of insect and disease epidemics and to replace these stands with young, vigorous trees. However, it is generally true that it is, "more lucrative to cut old-growth than it is to cut younger timber" in the sense that the higher quality logs and lower logging costs that characterize old-growth stands result in higher stumpage values.
5	With few exceptions most studies that address themselves to future wood demand and supply project future shortages. The BLM is not aware of the extent to which wood and wood products are used in urban landfills. Unquestionably, opportunities do exist for better utilization of the timber resource and it can be expected that the trend in improved technology to accomplish this objective will continue.
6	Certainly one goal of producing timber is to provide products that are price competitive with products made from other materials. However, the allowable cut is also based on other overriding objectives (e.g., environmental protection) and policies as described in Chapter I which preclude a solely maximization of production or price minimization objective.

National Wildlife Federation

1412 16TH ST., N.W., WASHINGTON, D.C. 20036 Phone: 202-483-1550

ew 40

June 13, 1975

Director
Bureau of Land Management
U. S. Department of the Interior
Washington, D. C. 20240

Dear Sir:

The National Wildlife Federation is pleased to comment on the Bureau's Timber Management Draft Environmental Statement, dated January 1975 (DES-75-10).

The report covering the timber management policies of the Bureau-managed
commercial forest lands in the Western United States and Alaska is well
documented and one with which we generally agree, at least in principle. We
1- do recommend, however, that additional consideration be given to a timber
harvest program built around wildlife habitat enhancement. The Federation
recognizes that some such considerations are being made now for the O&C
areas, but we feel that this factor has not been fully considered for the
areas outside western Oregon, including Alaska. It should be included as an
additional alternative.

For example, the production on the "Remaining Forests" dropped from 145 mil-
lion board feet in 1968 to 37 million board feet in 1974 during the inventory
period. Now it is proposed to increase this volume to 145 million board feet.
The report does not state whether there is a demand for this timber or not.
But since you are accelerating from 37 million board feet, we would suggest
that timber harvest for improved wildlife habitat be given careful considera-
2- tion. We do not believe that production for timber alone has much significance
in these forests. Whether you cut or not will have little impact on the re-
gional or national market, but you could have tremendous impact on the wildlife
habitat in several western states. Such a program implemented in cooperation
with state wildlife agencies would go far in enhancing wildlife habitat values
on commercially forested national resource lands.

Shifting our focus to another section of the DES, the Federation believes you
should expand the section on the objectives and limitations of the O&C and
Coos Bay Wagon Road Grant Lands to include a description of the formulae used
in determining funding and its apportionment for both areas. This should in-
3- clude an explanation of the manner in which money is allocated by the counties
to the Bureau for roads, recreation, reforestation and management. Also, a
short section should be devoted to timber management research including the
responsibilities of the Forest Service for basic research. The Bureau's role
in applying such research should be described.

Further, at least one other organization, the Wildlife Management Institute,
4- has raised the questions of wildlife need for old growth timber and the need
for a discussion of riparian vegetation. We agree that consideration of these
items is needed.

Additionally, the question of monoculture is not fully discussed. What are
the alternatives? Should plantings for wildlife be considered? Is brush re-
5- moval a critical factor in wildlife habitat? Finally, some of the descriptions
of logging systems and other management techniques are difficult to follow.
Perhaps a glossary of terms is needed.

Our comments on specific portions of the statement follow:

6- Page 1-1 - First paragraph: the addition of a sentence showing the percentage of national resource commercial forest lands in western Oregon would immediately put the program into better perspective.

7- 1-4 How are the 500,000 acres in western Oregon which are not designated for timber production classified?

8- 1-5 A description of allowable cut vs annual growth would help. In addition, the basis for the cut of old growth timber should be stated.

9- 1-6 Second paragraph: Does the 311,000 acres classified for "no cutting or special cutting" have any relationship to the 500,000 acres listed above?

10- 1-16 Identifying public wants and needs are also part of the planning system.

11- 1-32 Area burning: is it prescribed or controlled burning?

12- 1-44 Line 8: should read "cut thin barked trees?"

13- 1-61 Fifth line from bottom: roads are not "abandoned," they should be eradicated or put to bed.

14- 11-106 First paragraph: a list of the counties and their income would be informative.

15- 11-107 Last paragraph: crabbing and stream fishing for salmon and steelhead should be added.

16- 11-110 Third paragraph: the highway to Prudhoe Bay is completed and is in use. Also, the actual pipeline is being constructed as well as the bridge over the Yukon. This paragraph should be updated to reflect current status, insofar as practicable.

National Wildlife Federation

17- 111-32 Fourth line from bottom: improperly placed culverts can affect fish migration.

18- 111-50 Protection: prescribed burning should be mentioned.

19- 111-96 Second paragraph: areas clearcut in geometric patterns also create ill effects--witness the square and rectangular cuttings near Mt. Hood and Mt. Jefferson in Oregon.

20- IV-6 Protection: fire lines should be water barred and revegetated immediately after control.

21- IV-11 Last paragraph: screening should also be considered.

22- IV-22 First paragraph: intermittent salmon and steelhead spawning streams should be considered.

23- IV-34 Last paragraph: high brush control is important.

24- IV-42 Domestic Livestock: page 11-94 states that grazing is extremely limited in BLM forest land so it should not be a problem.

25- IV-52 Muffler design efforts have been devoted mainly to reducing their fire hazard.

The National Wildlife Federation appreciates the opportunity to comment on this draft environmental statement.

Sincerely,

THOMAS L. KIMBALL
Executive Vice President

cc: Chief, U.S. Forest Service
NWF Officers and Staff

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

National Wildlife Federation
Washington, D.C. 20036

Paragraph #	Response
1 and 2	Timber production levels (allowable cut) for the remaining forest, as well as for all other Bureau-administered commercial forest land, is determined through the Bureau Planning System described in Chapter I(C). Timber production is only available from those lands designated for such use and only by methods and quantities which are reasonably compatible with other resource uses and values.
3	Table II-9, Chapter II, briefly describes how receipts from timber sales are distributed. The distribution formula is also contained in the O&C Act of 1937, Appendix C.
	Chapter I(F) has been expanded to include a discussion of the Bureau's involvement and role in timber management research.
4	The needs of wildlife related to old-growth timber have been expanded in the corrected text (Chapter II). Riparian vegetation and its importance to aquatic and terrestrial wildlife has also been added to Chapter II and IV of the final environmental impact statement.
5	The specific needs of wildlife in each planning unit is now detailed in the Management Framework Plan of the Bureau Planning System. Need for wildlife plantings, protection of cover types and vegetative succession is detailed in the wildlife habitat management plan. The wildlife or fisheries biologist in each district advises the area manager on technical aspects of the plan.
	A glossary has been added to the environmental impact statement.
6	This comparison is made in subsequent paragraphs of Chapter I, specifically under the description of the western Oregon forestry program.

National Wildlife Federation
(Continued)

Paragraph #	Response
7	These sections of Chapter I concerning the western Oregon timber management program have been clarified.
8	The cited paragraph in Chapter I(A) has been expanded to reflect these comments.
9	See response to paragraph 7 above.
10	Part C, Chapter I, has been revised and expanded to reflect this comment.
11	The area burning as described in Chapter I is performed under a prescription for safe burning and smoke management.
12	The environmental impact statement is correct as written.
13	Chapter I has been revised to reflect your comment.
14	This paragraph has been revised to include a table indicating, among other things, payments to O&C counties for the years 1971 through 1975. Further detail, i.e. by county, was not considered appropriate or necessary.
15	Crabbing and salmon and steelhead angling have been added. In addition, a discussion of the impacts of timber management activities on estuaries has also been added to the text.
16	Your comments have been incorporated into the statement.
17	The discussion on the need for fish passage at culvert crossings has been amplified in the text.
18	The burning in Chapter III is under prescription and, therefore, prescribed burning is included within the term area burning.
19	Chapter III(J)(2) recognizes that clearcutting can cause adverse impacts on physiography and structures of geologic interest.

National Wildlife Federation
(Continued)

Paragraph #	Response
20	Damage caused by fireline construction may be corrected in the final stages of fire suppression. Restoration work is performed as soon as practical under conditions which will achieve a high success. There are many factors that influence restoration work and each project requires an evaluation and analysis prior to any work being performed. In many cases teams of specialists are working on a restoration plan before the fire is out. Chapter IV of the text has been revised to reflect that firelines will be water-barred and revegetated as soon as practical where critical conditions exist.
21	This paragraph is describing means of mitigating impacts of rock quarry development on soils. Mitigation as you suggest is recognized in a subsequent paragraph J(1)(a) of Chapter IV.
22	Intermittent streams with fisheries value have been added to the text.
23	High brush or browse control has been added to the text.
24	This sentence has been deleted because of redundancy. By in large, however, livestock grazing on lands available for timber production is limited compared to that occurring in non-productive forest and non-forest areas.
25	We agree.

DANIEL A. POOLE
President
L. R. JAHN
Vice-President

WILDLIFE MANAGEMENT INSTITUTE

IRA N. GABRIELSON
Board Chairman
L. L. WILLIAMSON
Secretary

Dedicated to Wildlife Restoration
709 WIRE BUILDING, 1000 VERMONT AVENUE, WASHINGTON, D. C. 20005 (202) 347-1774

May 1, 1975

Director (340)
Bureau of Land Management
Washington, DC 20240

Dear Sir:

The Wildlife Management Institute is pleased to comment on the DRAFT ENVIRONMENTAL STATEMENT FOR TIMBER MANAGEMENT (DES 75-10) prepared by the Bureau of Land Management.

The statement covers all present and potential timber management policies on BLM lands in the United States, including Alaska, but much of the material is devoted to the O and C lands in Oregon. For such a broad ranging Impact Statement, we find this remarkably complete and much superior to the Statement on Grazing prepared in 1974.

1- The major deficiencies in the statement are of omission. First and foremost is the limitation of the discussion to only three alternatives; the present system, no timber harvest, and limited harvest.

2- A fourth alternative is needed for wildlife purposes. Provision should be made for a certain amount of old growth forest continuously available for wildlife species requiring such habitat. This forest would be from 150 to 300 years old and would rotate as disease, blow down and fire required salvage operations. A portion of this alternative would also have a positive program for preserving snags and cull trees throughout the forest.

3- A second major deficiency is the limitation of discussions of vegetation to two major classes - terrestrial and aquatic. We strongly urge that the final statement contain equivalent discussions of riparian vegetation, which often is of critical importance to both fish and wildlife species.

4- The statement does not adequately consider ecological ramifications of rapid reforestation with the same commercial species that were removed, thus by-passing several sereal changes in plant succession. What are the long-term impacts on soils, wildlife, and the health of the forest itself with this continuous monoculture? Data on some of the factors involved are available in European literature.

5- There is no discussion of the unique funding involved in O and C administration and of the effect of 75 percent return to the counties of timber sale revenues. This insures a very effective and vociferous political power base for continuation of present land management practices, and results in severe political pressures on BLM district and State managers. It is a major environmental factor in the present management of the O and C lands, and this influences all other resources and uses.

6- We find no mention of the effect of State Forest Practices Acts on management of BLM timber lands. Oregon has one of the better laws. The Council on State Governments is expected to approve a model act this year. Does BLM comply?

7-- There is a great deficiency of definitions of terms. This lack of definition causes confusion about meanings in the hundreds of pages of discussion, especially since different individuals and teams wrote different sections of the statement. A glossary of definitions should be provided, preferably in the introduction.

8- Channelization is a logging impact not discussed. It can be critical to fisheries, especially when V canyons are logged.

9- Impacts of roads that make large areas accessible for use by off-road vehicles should be explored in the statement. ORV use can have serious impacts on wildlife populations.

10- The subject of use of slash and visibility screens to mitigate damage and harrassment to big game animals, particularly Rocky Mountain Elk, has been analyzed by a select wildlife committee in preparing guidelines for salvage of Tussock moth killed trees. We suggest that appropriate sections of that analysis be incorporated into this statement.

11- After this draft impact statement was prepared, a new document, WILDLIFE AND FOREST MANAGEMENT IN THE PACIFIC NORTHWEST, has been published by the School of Forestry at Oregon State University. Much information in this document would be valuable in preparation of the final impact statement.

12- We believe the widespread use of contract loggers by many companies creates problems of maintaining good environmental standards in timber harvests. The statement should discuss this.

13- Is there a possibility of designing and using some quarries and borrow pits for target ranges? Some are used on an ad hoc basis now - why not plan for this use as a recreational benefit?

14- The bibliographies contained in each section should be listed alphabetically. It is very difficult to check on use or non-use of particular sources of information as they are now presented.

15- We also would ask what research projects BLM is funding now and in the past few years? Are these filling in the many information gaps in the statement?

Comments on specific pages of the statement follow:

16- Page 3. An energy and fiber short nation should at least mention potential fuel and fiber values of woodland.

17- Page I-1, para. A. Explain why BLM lands have 2 percent of the nation's wood supply and 3 percent of the nation's wood production.

18- Page I-2, line 1. What is the average clear cut size if 40 acres is maximum?

19- Page I-4, last sentence. Cite authority for employment figures, cite year it applies to. Is it a recession or a high? Figures are meaningless and misleading without qualification.

20- Page I-5. The figures 49,000 acres and 154,000 acres should be expressed as percentages of 1,900,000 acres for timber production.

21- Page I-6, lines 12 and 13. Acreage for livestock range and critical wildlife habitat should be separated. They are not related, as pointed out in succeeding sections of the EIS.

22- Page I-13, last paragraph. Only one critical term is defined; all should be.

23- Page I-26, last paragraph. 40 acre clear cuts are too big for best wildlife production. We would suggest areas not to exceed 25 acres.

24- Page I-27, first paragraph. Best multiple use management would require three more guidelines. First, insure compliance with good state forest practices laws; second, provide for small cuts to correct scenic damages from old clear cut lines, particularly on skylines, and third, state the requirements to yard and pile most damaged deformed and diseased wood over 8 inches in diameter. (Much would then be used).

25- Page I-36, para. snag felling. The principal reason for felling most snags is a requirement of state industrial accident laws, not of forest management.

26- Page I-42, (2) Biological control - underline the word 'diseases'. Last paragraph. The citation used is dated 1966. Current information on Tussock moth controls does not agree with this reasoning.

27- Page I-46, first sentence. This entire listing ignores an ecological silvicultural management approach using plant succession, fire, and other factors largely responsible for creating the old growth forests now being harvested.

28- Page I-48, last paragraph. These trees are not worthless - they have high wildlife value for future production of soft snags. See Siri Jackman's work at Oregon State University on this subject.

29- Page I-61, paragraph 3, 2nd sentence. The word 'abandoned' does not adequately describe these roads. Some term, such as "put to bed" or "closed" would be better. Hopefully these roads will be seeded and drained before this action.

30- Page I-77, first line. Do these acts include the provisions of the older Federal Antiquities Act?

31- Page II-74, Aquatic vegetation. Does this include riparian vegetation? See our remarks in the general comments.

32- Page II-78, paragraph 2, 2nd sentence. Although the requirements of food, water and cover are usually well met - they are not always well distributed. This statement should be qualified accordingly.

33- Page II-79, paragraph 1, last sentence. Cavity nesters, constituting 40 percent of the forest bird species, also need dead and dying trees.

34- Page II-79, last line. Although the Columbian Whitetailed Deer is found in the Coniferous Forest BIOME, it is found only in the flood plain of the lower Columbia River and is not found on lands administered by BLM. Eliminate or qualify this statement.

35- Page II-81, paragraph 4. We question whether the Alpine zone is "typified" by the "rare wolverine." Select a more common species as an example.

36- Page II-93, Introduced Trout. Add KOKANEE.

37- Page II-108, First full paragraph. County parks should also be included.

38- Page II-114, third paragraph. The Montane Forest was also used by the Plains culture.

39- Page III-5, para. 2, line 5. Add "and in some instances almost totally eliminated."

40- Page III-6, line 12. Add after the word "maintained" the phrase "If proper timber management methods are prescribed and enforced."

41- Page III-6, last paragraph, 1st sentence. We do not agree that improved technology will minimize these risks, especially to wildlife. Harrassment and monoculture will be an increasing problem.

42- Page III-7, line 3. "Improvement" for what?

43- Page III-7, para. 2, line 2. We do not consider liquidation of old growth in the next 25 years to be gradual. We consider it to be very rapid (see page III-5 for the wildlife descriptions).

44- Page III-8, line 6. This often may be bad for wildlife.

45- Page III-12, 1st paragraph. Add a statement that removal of old growth can result in a near complete loss of those species requiring a 200+ year old forest.

46- Page III-15. In this table, as in all similar tables, a line listing effects on wildlife requiring old growth should be included.

47- Page III-21, last sentence. Add a statement that this could be very serious and might result in addition of some species to the rare or threatened list.

48- Page III-52, 2nd paragraph, last sentence. This statement requires explanation and a citation.

49- Page III-53, line 5. Define "Weed" and list species or examples of plants in this category.

50- Page III-62, last line. These browse species that appear may not necessarily be "valuable", i.e., Red Alder.

51- Page III-67, line 1. Name species that will be "eliminated". Line 4 - What is a "small clearcut"; how many acres? On this page, add some consideration of the harrassment factor of one clear cut vs. several partial cuts. Also, add a section on effects of utilization of large slash and its effect on forage logs for woodpeckers and other birds. Jackman and Bull at Oregon State University have discussed this.

52- Page III-69, line 10. Define and explain "standing slash."

53- Page III-73. This is one of the only 2 or 3 times riparian vegetation is even mentioned in the EIS.

54- Page III-74, para. 2. This section should have a paragraph devoted to stream blockage from logging debris.

55- Page III-75, Transportation, 2nd sentence. Add "Major" before the word "impacts."

56- Page III-76, para. 1, line 18. Explain how structures, especially culverts, become impassible fish barriers. Many readers are not familiar with this problem.

57- Page III-77, 1st paragraph. Here, or somewhere in the preceding section on logging Transportation and Maintenance, the extreme vulnerability of intermittent streams to these activities should be pointed out. Some of these streams are excellent spawning and nursery areas for steelhead, even though dry in the summer.

58- Page III-93, line 9. Add "especially near park and recreation areas" after "objectives."

59- Page III-94, para. 2. The presence of large blackened, partially burned slash, is also unattractive, although it may have significant wildlife value.

60- Page III-96, para. 2. The presence of sharp edged clear cuts, especially on ridges, has an adverse visual effect.

61- Page IV-1. We suggest this entire section of Mitigative measures be rewritten, expanded, and the authority and regulation or rule cited. It is much too brief as written and explains little. It seems more wishful thinking than a mandatory land use practice. This should be one of the better descriptive and explanatory sections in the EIS.

62- Page IV-7, Logging Methods, 4th line. Tractor skidding should also be prohibited through any spring, bog, marsh, or seep. Clearing of a skid road for over two trees is still too few. Give a higher number.

63- Page IV-8, Transportation. The fisheries or wildlife biologist should participate in field inspections preliminary to road location.

64- Page IV-10, line 7. After "culverts unplugged", add "and suitable for fish passage."

65- Page IV-11, last paragraph. Quarries should also be located out of sight of commonly traveled roads.

66- Page IV-22, 3rd line. Intermittent streams with any fishery values should also have buffer strips as should those with a silting potential.

67- Page IV-34, last paragraph, line 4. Brush removal need not be avoided where it is a useful wildlife habitat management activity.

68- Page IV-35, past paragraph, lines 9 and 10. Reservation of snags as outlined is not sufficient. Needed is a discussion of hard and soft snags and the relation to them of cull trees. The next paragraph, on Page IV-36 regarding girdling is very commendable.

69- Page IV-37, para. 1. Seeding discussion ignores the lack of knowledge on browse and its seed sources. Most plantings are of readily available grasses, not what is best for wildlife.

70- Page IV-48, para. 2, last sentence. "To the extent feasible" and "seasonal restrictions", when applied to den and nesting trees are not sufficient protection. They only delay the inevitable, not protect vulnerable species or preserve essential habitat.

71- Page IV-52, line 4. Add at the end of this line "particularly on ridge tops."

72- Page V-2, last paragraph, line 2. The demise is not gradual, it will be done in 25 years. Damages can be reduced by a longer rotation on portions of the forest, allowing enough 150-200+ trees to maintain some mature forest habitat at all times.

73- Page V-7, last paragraph. We do not understand this example; explain why.

74- Page VI-5, Terrestrial Wildlife. Add a sentence that removal of snags and dead and dying trees has a very long term adverse impact on wildlife.

75- Page VI-6, Soil organisms. Rewrite this paragraph; it is tortured.

76- Page VII-4, para. 3. Add "or rendered threatened on most of its range." at the end of the sentence.

77- Page VII-5, last paragraph. Accidents also include men injured and killed felling snags. There are many more men in that category than are injured or killed by snags when logging.

78- Page VIII-11. Add a "wildlife in old growth" line to this chart.

79- Page VIII-18, para. 1. Add "or eliminated" at the end of the paragraph.

80- Page VIII-27. Add "old growth species" to this table.

81- Page VIII-34, #9, wildlife. We disagree with the first sentence. The initial impact will be countered by repeated impacts and harrassment.

We have not attempted to be super critical of this statement. Overall it is a good statement. Our interest is in increasing recognition of all wildlife impacts and in minimizing and offsetting adverse effects on wildlife created by timber management.

Please take our comments in that context.

82- We are concerned that the Wildlife Management Institute, one of the oldest and best technically staffed national conservation organizations, was left off the list of organizations to whom documents were distributed, and from whom comments were requested, while the rest of the major conservation community was on that list (Page IX-2). We found it necessary to request copies of the statement. We ask that the Institute be added to future distribution lists of Environmental Impact Statements from the Bureau of Land Management.

Sincerely,

Daniel A Poole

Daniel A. Poole
President

DAP:mkv

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Wildlife Management Institute
Washington, D.C. 20005

Paragraph #	Response
1 and 2	Reservation of specific areas for wildlife purposes, including old-growth forests, is a functional component of the Bureau Planning System described in Chapter I(C). Land use decisions of this nature are prerequisite to calculating allowable cuts and implementing timber management programs.
3	Discussion of riparian vegetation has been added to Chapters II, III, IV and V of the text.
4	The loss of old-growth habitat for wildlife has been discussed in Chapters III and V of the revised text.
5	Table II-9 includes information relative to receipt distribution. Appendix C, The O&C Act of 1937, also provides discussion on this subject.
6	Bureau policy requires coordination and cooperation with responsible state resource management agencies and respective state laws in the conduct of an economical, technical and environmentally sound timber management program. In many instances, state forest practices and related legislation provide the framework and necessary guidance for achieving these goals.
7	A glossary of terms has been included in the revised text.
8	Chapter III and V of the text have been revised to reflect this comment.
9	The final environmental impact statement recognizes that extension of logging road systems and the attendant increased use by recreational type vehicles, including off-road vehicles (ORV), will cause adverse impacts on wildlife. This subject will be covered in greater detail in site-specific environmental documents.

Wildlife Management Institute
(Continued)

Paragraph #	Response
10	The guidelines referred to were prepared for specific project areas on the Umatilla and Wallowa-Whitman National Forests. They may or may not be applicable to Bureau-administered lands for a number of reasons. Most importantly, it should be remembered that Bureau-managed lands are often characterized by a "checkerboard" or scattered ownership pattern which would make several of the guidelines difficult or impossible to comply with. It should also be noted that many of the criteria specified in Wildlife Guidelines - Tussock Moth Salvage Operations are included in the final environmental impact statement as mitigating measures which will be used in the timber management program to protect wildlife and wildlife habitat.
11	The reference "Wildlife and Forest Management in the Pacific Northwest" will be a valuable reference for all forest management impact statements.
12	Maintaining environmental standards relating to Bureau lands and timber management activities is the responsibility of Bureau employees at all management levels. Admittedly, situations involving negligent operators do occur but we cannot unequivocally point the finger at contract loggers, small or large companies. In the final analysis, it is the responsibility of the Bureau and its designated authorized officer to insure that environmental stipulations and provisions of the contract are administered and enforced.
13	Use of quarries and borrow pits for target ranges are considered in the process of the Bureau Planning System (described in Chapter I). Where demand is indicated, quarries and borrow pits could be designed and used as target ranges provided it is consistent with other resource needs and uses.
14	Bibliographies appearing at the end of each chapter are cross-referenced to the text by number.

Wildlife Management Institute
(Continued)

Paragraph #	Response
15	Over the past several years the Bureau has engaged in numerous and a variety of studies relating to forest resource management. These studies have ranged from "Identifying Conifer Seed Odors Which Attract Rodents" to the "Alsea Watershed Study." Many of these studies are carried out in coordination and cooperation with private, state and other federal land managing agencies. Additionally, the Bureau relies on independent research conducted by universities, private organizations, and other federal agencies, especially the U.S. Forest Service. Information gained from these research projects is aiding in the Bureau's efforts to fill the information gaps.
16	Although woodland management is a part of the overall forest management program, it is not considered in the context of the environmental impact statement as part of the Bureau's timber management program. Woodland generally refers to those areas supporting forest-type growth but which are incapable of producing forest products on a sustained-yield basis. Such areas are, therefore, excluded from the timber production base.
17	The cited paragraph in Chapter I(A) of the statement has been expanded to reflect this comment.
18	Recent clearcuts on Bureau lands average from 30-35 acres. The cited sentence has been modified to include this information.
19	The text has been revised and now includes a citation for the data source.
20	This section of Chapter I has been revised. Figure I-4 and Table I-3 now include the information you suggest.
21	Reference to protection of 118,000 acres of livestock range and critical wildlife habitat has been deleted since these acres do not fall within the commercial forest land category.

Wildlife Management Institute
(Continued)

Paragraph #	Response
22	Forest management is defined since this is the purpose and focal point of the environmental impact statement.
23	Forty acres is used to indicate the maximum size. Chapter IV (G)(1) states that "clearcutting will usually be confined to small, scattered tracts ranging from 15 to 40 acres in size so as to produce the greatest "edge" effect . . . ."
24 (Item #1)	Compliance with good state forest practices laws is an integral part of the Bureau's timber management program. The major guidelines as stated in Chapter I(D) reflect the general requirements of these practices.
(Item #2)	General guidelines, as stated, provide for visual resource management techniques.
(Item #3)	General guidelines state that utilization of slash and cull logs is of first order preference. This would include gross yarding of these materials as suggested.
25	Snag felling concurrent with timber sale operations is a requirement of both state industrial accident and fire protection laws. Snag felling operations described in the final environmental impact statement are separate from timber harvest activities.
26	Chapter I of the text has been revised to reflect your comment.
27	The approach suggested would not meet the needs of an intensive timber management program.
28	From a wildlife standpoint, we totally agree with your comment. As written, however, the impact statement merely points out that merchantable wood (i.e., wood from which lumber, veneer, etc., can be manufactured) will be lost if damaged timber is not harvested within a reasonable period of time. The value of damaged timber for wildlife purposes is discussed in Chapter IV.

Wildlife Management Institute
(Continued)

Paragraph #	Response
29	Chapter I of the statement has been revised to reflect your comment.
30	No, the Antiquities Act of 1906 and the provisions contained therein remain in effect for all federal lands.
31	See response to paragraph 3.
32	The text has been revised to reflect this comment.
33	Chapter II (I)(1) has been revised to reflect this comment.
34	This section of the text has been modified to reflect your comment.
35	Wolverine has been removed and the Ptarmigan Lagopus has been substituted as an animal typical of the Alpine zone.
36, 37, 38, 38, and 40	The text has been revised to reflect these comments.
41	It is our opinion that improving technology will minimize risks to some degree.
42 and 43	These sentences have been modified to reflect your comments.
44	This material has been deleted from Chapter III.
45	Chapter III has been revised to reflect this comment.
46	Appropriate sectons of the text have been revised to indicate the impacts of timber management activities on wildlife requiring old-growth timber. Addition of such a category to the summary, Table VIII-1 (formerly Table III-1), however, is inappropriate since this table is expressing cumulative impacts on general categories of environmental components. The "specific" category you suggest is, we believe, contained within the framework of those wildlife categories listed.

Wildlife Management Institute
(Continued)

Paragraph #	Response
47	Chapter III has been revised to reflect your comment.
48	By interrupting the normal successional pattern and maintaining seral stages for long periods, the forest is more susceptible to insect and disease outbreaks because of the extensive continuity in species, age, microclimates and other factors favorable to insect and disease infestations. Authoritative individuals in the fields of pathology and entomology, however, have differing views regarding this concept. Additional discussions may be found in Even-Age Management, Proceedings of a symposium, August 1, 1972, published by the School of Forestry, Oregon State University, March 1973 (Paper 848).
49	"Weed" is defined in the glossary.
50	We agree. The impact statement does not specify which valuable browse species will be favored.
51	The Northern spotted owl has been added as a representative species which could be eliminated. As indicated previously, clearcuts are 15-40 acres in size (average 25-35 acres). The harrassment factor on Rocky Mountain Elk has been discussed, as an example of clearcut versus partial cut. Large slash and forage logs, their relationship to birds and the impacts they may have on streams, has been discussed in Chapter III.
52	This term has been clarified.
53	Discussion of riparian vegetation has been expanded throughout the text.
54	Chapter III has been expanded to reflect this comment.
55	In our opinion, the terminology used is sufficient and accurately describes the potential impacts.
56	Chapter III of the text has been revised to reflect your comments.

Wildlife Management Institute
(Continued)

Paragraph #	Response
57	The importance of intermittent streams is recognized throughout the text, including Chapter III.
58	Chapter III(I)(8) has been revised to reflect this comment.
59	Chapter III(J)(1)(a) states that slash burning creates visual impacts. This includes charred slash piles.
60	Chapter III(J)(2) recognizes that poorly designed clearcuts can have adverse visual effects.
61	All of the mitigating measures identified in Chapter IV are viable and most are currently being employed in the timber management program. We further do not see the need for citing a specific authority, regulation or rule for each mitigating measure since all are broadly covered by the existing legislative authorities cited in Chapter I.
62	Bogs, marshes and other wet areas have been included in the discussion of yarding practices. We have modified the statement concerning clearing of skid trails to indicate that this will not be a usual practice. Under certain circumstances, clearing trails for 1 or 2 trees may be entirely justified.
63	Chapter IV has been revised to reflect your comment.
64	This particular discussion is in reference to culverts in ditches and not in stream crossings.
65	Chapter IV (J)(1)(a) states that quarry sites will be selected and/or rehabilitated so as to reduce visual impacts.
66	Chapter IV has been revised to consider your comment.
67	This paragraph in Chapter IV has been revised to reflect your comment.
68	Cavity bearing trees have been added to the discussion in Chapter IV.

Wildlife Management Institute
(Continued)

Paragraph #	Response
69	Chapter IV has been modified to reflect your comments.
70	Chapter IV (G)(1) states that "where appropriate, cutting will be prohibited or highly selective around critical wildlife areas . . . ." Critical habitat and vulnerable species will be protected.
71	Chapter IV has been revised to intergrate the concepts and techniques of visual resource management into timber sales planning.
72	Chapter V has been revised to reflect your comment. Further, mature habitat (old-growth forests) will exist in perpetuity since not all Bureau forest lands are available for intensive forest management.
73	The example points out that adverse impacts could occur despite management efforts to provide successful conditions for regeneration. Unforeseen competing vegetation (environmental condition) could cause regeneration failure, thus, requiring follow-up treatments.
74	Chapter VI has been expanded to reflect your comment.
75	Chapter VI, Soil Organisms, has been rewritten.
76	Chapter VII has been expanded to include your comment.
77	This paragraph includes injuries and deaths related to snag felling since the majority of this type work is done concurrently with timber felling operations.
78	This summary tabulation has been consolidated with other program alternative summaries and now designated Table VIII-1. Your suggestion regarding the addition of "Wildlife (In old-growth)" to this and other similar tables has been discussed in our response to paragraph 46 above.

Wildlife Management Institute
(Continued)

Paragraph #	Response
79	Chapter VIII has been expanded to include your comment.
80	See response to paragraphs 46 and 78 above.
81	Chapter VIII(9) has been revised to reflect your comment.
82	We regret this oversight and inconvenience.

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NORTHWESTERN UNIVERSITY
EVANSTON, ILLINOIS 60201

PUBLIC LANDS PROJECT

2040 SHERIDAN ROAD
EVANSTON, ILLINOIS 60201
TELEPHONE (312) 492-3559

June 10, 1975

Mr. Curt Berklund
Director, Bureau of Land Management
U.S. Department of the Interior
Washington, D.C. 20240

Re: Timber Management
Draft Environmental Statement

Dear Mr. Berklund,

This letter represents the comments of the Public Lands Project on the above named draft environmental impact statement (DEIS). The Public Lands Project conducts research on the administration of natural resources, particularly on the administration of public lands administered by agencies of the federal government. These comments should be considered to be the comments of the Public Lands Project as an organization; the comments are not those of Northwestern University.

We are pleased to be able to review the Bureau's timber management (TM) program, and appreciate this opportunity to have the Project's comments considered by the Bureau and to have our comments appended to the final EIS.

MAJOR SUBSTANTIVE COMMENTS

1. Level of Programmed Annual Allowable Harvest. One of the, if not the, most important aspects of a timber management plan is the level of proposed harvest, that is the number of board feet you will be logging. Holding other things constant (i.e., mitigating measures), the level of the harvest determines the magnitude of the environmental impacts associated with the timber program. However, the DEIS provided no discussion of how the figures for annual allowable cut were arrived at; it merely states that the harvest will be 1.172 MMMBF for the O&C lands and .145 for public domain lands, for a total harvest of 1.317 MMMBF.

Perhaps as an appendix to the final EIS, the Bureau needs to provide:

-- A detailed calculation of the annual allowable harvest based on acreage, stand characteristics, inventory volume per acre, and regeneration assumptions;

-- A summary breakdown of these calculations for each of the 13 O&C and 18 public domain "sustained yield forests;"

-- An indication of the penalties or bonuses applied to the calculated allowable cut for meeting or failing to meet reforestation requirements.

The Bureau needs to explain, essentially, why the DEIS is technically justified in proposing an annual allowable cut which is three times larger than the annual growth (p. I-5). We understand that the reason advanced verbally in the

EIS is theoretically sound, but you have to provide data which would allow technical forestry commentators to evaluate whether the specific level of cutting you propose is technically correct.

The reason this information is important is that, as you note on p. I-23, your timber program should be "based on the principles of sustained yield." You need to assure commentators that, in fact, your proposal to continue timber harvesting at a 1.3 MMMBF level will lead to sustained yield.

1a. As an aside, your criterion for sustained yield is not a proper definition of sustained yield(pg. I-23). Output could remain constant from decade to decade for two or three decades, but then drop off because previous harvests exceeded sustained yield levels or for other reasons (e.g., lack of adequate reforestation). Your definition would allow you to call such a pattern "sustained yield," when it was in fact short-term exploitation which impairs long term productivity. This is not a quibbling point, of course, because this pattern is precisely what critics of the level of logging in the northwest alledge is occuring at present. The Congress has defined "sustained yield" to be "the achievement and maintence in perpetuity of a high level annual or regular periodic output of the various renewable resources...." (16 U.S.C. § 531(b), emphasis added)

2. Clearcutting. The Bureau's policy of applying a clearcutting prescription to much of the acreage under timber management is obviously a controversial practice. The DEIS states in several places that the clearcuts will be in 10 or 15 to 40 acre patches, averaging 30-35 acres (pp. IV-36, VIII-29). However the DEIS does not specify the criterion which will determine the size of any given clearcut.

There are two reasons for clearcutting. First, it is cheaper for operators to log with the clearcutting method. Second, certain species require clearcuts (are "shade intollerant") for regeneration. The first reason is absolutely illegitimate, and should not influence Bureau practice. The second is quite important, since a number of other important values (sustained yield, prevention of soil loss, etc.) are dependent on efficient regeneration. However, the size of clearcuts should be minimized, not only for aesthetic reasons, but to help minimize soil loss, increase edge, etc.

First, what is Bureau policy for determining the size of clearcuts?

Second, if you do not have explicit policy on this subject, you ought to adopt the policy that:

-- The size of the clearcuts will be the minimum biologically necessary for stand regeneration, based on the tree species;

-- The configuration of the clearcut will definitely meet the criteria specified as landscape architecture mitigating measures (p. IV-52).

2a. Your assertion on pp. VIII-29-34 that eliminating clearcutting will spread environmental impacts over a wider area and increase logging entries, given that the level of harvest stays constant, is well taken. This consideration, viewed in conjunction with the silvicultural requirements for regeneration of certain

species, suggests that clearcutting has certain environmental advantages. The prevailing practice of land use in adjacent lands would also be another consideration in evaluating the practice of clearcutting. As we note below, comment # 15, the DEIS gives little information on land use in adjacent non-BLM-managed land. If, for example, adjacent land was managed by private timber operators, and harvested using clearcutting methods, then the Bureau might be less constrained to forego use of clearcutting.

Please discuss in the final EIS the advantages and disadvantages of clearcutting in situations where adjacent non-BLM lands are harvested using clearcutting, and selective or shelterwood cutting where adjacent non-BLM lands are not being subjected to clearcutting.

3. Use of Chemical Herbicides and Pesticides in Timber Management. The use of various chemical herbicides and pesticides is discussed throughout the DEIS, as a part of the proposed action, as a part of the environmental impacts of the action, and as related to mitigating measures. These practices include several significant and major agency actions, such as herbicide treatment of some 19,200 acres annually in western Oregon for weed control and stand conversion, and treatment of 1000 acres in Colorado to control pocket gophers.

Is it true that:

-- The Timber Management EIS does not constitute fulfillment of the requirement of NEPA § 102(2)(c) to prepare a statement on the environmental impacts of chemical herbicide and pesticide use ; and,

-- Approval of the Timber Management program in no way constitutes a justification for the use of chemical herbicides and pesticides with significant, adverse environmental impact, nor in any way precludes the objective consideration of a "no program" alternative in an EIS on the use of such herbicides and pesticides?

3a. To help summarize the relationship of the timber management program to the use of chemical herbicides and pesticides, could you please provide (perhaps as an appendix), a parsimonious table showing:

-- Which chemical herbicides/pesticides may/will be used in connection with timber management activities;

-- The function of the chemicals;

-- A summary of the regulations, determinations and other findings of other governmental agencies (e.g., EPA, FDA, etc.) about those chemicals.

4. Improved Utilization. Improved utilization of wood products is a major thrust of other federal timber management programs. (Cf., USDA, Forest Service, Environmental Program for the Future, Washington, June 1974.) However, the DEIS does not mention this at all, much less as a major goal of Bureau policy. Why?

Improved utilization is particularly possible in the O&C lands, because the intensive forest products industry development obviates some of the scale economy problems which make increased utilization difficult in other areas. The advantage of increased utilization is that it allows for one of two beneficial outcomes, or some combination of these outcomes:

-- Decreased logging to meet a constant demand for wood products, decreasing the total of adverse impacts such as road construction, clearcutting's negative aesthetic impacts, erosion and soil loss, etc., and/or allowing for the abandonment of adverse practices such as clearcutting without increasing the number of entries necessary to maintain the allowable cut;

-- Increasing the supply of wood products without increasing logging, holding adverse impacts constant, and not endangering sustained yield productivity.

Please discuss why you have not addressed this very real and very advantageous policy.

5. Alternative, Non-timber Uses of BLM Forest Lands. The basic public policy question in land management is the relative emphasis of one use or type of use over other potential uses for a given parcel of land or a general class of lands. This seems to be particularly appropriate for a programmatic EIS. For example, on most of the National Resource Lands the dominat question is whether domestic livestock grazing or wildlife grazing is the optimum use of the land. However, the DEIS does not address the question of (i) what other potential uses can be made of BLM-administered forest land, and (ii) which of the several uses is the optimum use.

For most federally-owned forest land, the dominant question seems to be whether forests should be managed for timber production or recreational uses, especially as designated Wilderness.

For most practical purposes, the Timber Management DEIS focuses on the O&C lands. Thus the final EIS ought to summarize the possible alternative uses of the O&C lands and state the reasons for devoting these lands to primarily timber use. In a sense, that is, you ought to summarize the current state of the MFP process with respect to BLM forest lands.

In particular, could you please address the following alternate management emphases, particularly as they might relate to the O&C lands.

5a- -- Timber management is usually inconsistent with intensive recreational development. Is there a potential for intensive recreational development on O&C lands?

5b- -- Timber management is absolutely inconsistent with Wilderness designation. If the BLM were given the authority to recomend Wilderness areas for Congressional designation (i.e., under the Organic Act currently under consideration in the Congress), are there any areas of BLM-administered forest land which might qualify for designation as Wilderness, particularly in light of the minimum acreage (5000 acres) mentioned in the Wilderness Act, and the general pattern of 640 acre, "checkerboard" land ownership on the O&C lands?

5c- -- Is "de facto wilderness" management, which you allude to throughout the DEIS, a possible alternative use? This management emphasis seems dependent on land use on adjacent, non-BLM land (see comment # 15, below.)

5d- Related to these questions, hiking and backpacking is an important form of recreation, and in some areas is the highest volume recreational use in the region. This form of recreation was not, however, listed as one of the predominant forms of recreation on pg. II-101. Could you please list the distribution of visitor-days among the various types of recreational uses of BLM forest lands.

6. The first paragraph of page IV-2 implies that the mitigating measures discussed in section IV may not be practiced as a matter policy. This disclaimer is a "catch 22:" timber management has adverse environmental impacts; but the adverse impacts will not cause decreased logging because the impacts are mitigated by a variety of measures; but the mitigation is negated, because mitigation may "be subjugated to overall national priorities and needs."

Under exactly what conditions would which mitigating measures be suspended, and who would make such "management decisions?" The suspicion, of course, is that local district managers might make such decisions under broad grants of discretion whenever the local forest products industry cried "wolf," and suspend the most important, and costly, protective measures.

Also, the most basic "overall national priorities" are the statutes listed on page IV-2 (The Federal Water Pollution Control Act, Clean Air Act, Fish and Wildlife Coordination Act, NEPA, etc.), and these priorities are the basis for the requirement that the Bureau carry out the mitigating measures described in section IV. Since these are statutes, they have a higher force of law than "management decisions" based on some vaigue perception of "national priorities and needs." You ought not "subjugate" mitigation to any "overall national priority" than the laws listed in paragraph 2, pg. IV-2.

7. Encouragement of Less Destructive Yarding Technologies. The DEIS discusses the variable impacts of different yarding methods quite thoroughly. However, the DEIS never translates that discussion into any concrete proposals to minimize adverse impacts by causing less destructive yarding methods to be used by timber operators. For example, alternative C, "Other Timber Harvesting Practices," discusses only an alternative cutting prescription (3-stage shelterwood); perhaps the final EIS ought to discuss an "alternative C-2," "mandatory yarding practices."

The DEIS does state in several places that the less destructive yarding practices will be "encouraged." However, "encourage" is a vaigue word, and can mean -- and probably does mean -- ineffective things like persuasion. Encouragement and persuasion are not likely to change operators' yarding preferences, because, as you note, those preferences are based on solid economic grounds. Are there changes in BLM contract procedures which can cause operators to use more expensive, less destructive practices, such as aerial (skyline, baloon, helicopter) yarding systems? For example, could the Bureau as a matter of policy adjust the stumpage price of sold timber to reflect the higher cost of aerial systems?

8. The DEIS notes on pg. VIII-39-40 that the harvest from industry-owned land will decline because of the depletion of old growth sawtimber. Is this depletion the major reason for the increasingly intensive timber management program on BLM forest land?

9. Offsetting Decreased BLM Harvest with Increased National Forest Harvest. We strongly oppose the concept represented by alternative D, pp. VIII-38-39, of allowing for decreased BLM timber harvest by increased harvest on Forest Service land. Irrespective of whether the BLM could cause such a policy, it is unwise, and only transfers a problem from one federal agency to another. Particularly in Region 6 (Oregon and Washington), the Service is already logging heavily, and the suspicion is that they may be logging at greater than sustained yield rates already, with heavy reforestation backlogs, etc. The last thing the Forest Service needs is to make up the Bureau's 1.3 MMMBF!

OTHER SUBSTANTIVE COMMENTS AND PROCEDURAL COMMENTS

10. How is the employment base discussed on pg. I-4 calculated? Does this figure represent the forest products industry employment times the BLM percentage of total harvest? If so, this may well overstate the importance of BLM timber because harvest from National Forest and industry lands is more likely to be the base of sector employment. This point, of course, relates to a fundamental justification for the program, the trade off of employment and environmental impacts and foregone alternative land uses.

11. Slash Height. The DEIS does not discuss BLM policy on slash and stump height, although the examples in the manual contract provisions (appendix A) imply that twelve inches is standard. This is one of the most important aspects of sale area regulation by the agency. What is / is there a Bureau policy on slash and stump height? In particular, as a matter of policy does slash height vary depending on environmental or aesthetic considerations?

12. "Speculative Homesite" Development. What is the relationship of "speculative homesite" development (pg. II-100) to BLM lands? Can the Bureau act to restrict this practice in cooperation with local government? Can the Bureau act to restrict this sort of development without the cooperation of local government?

13. Misstatement of Public Concerns About Timber Management. The DEIS discusses divergent group preferences about timber management (pp. III-94-95) under the heading of "aesthetics," and the Bureau's response to citizen concerns seems to be the proposal (p. IV-52) to "educate" the public to "allay" fears about timber management. This is a simplistic, almost patronizing perception of the public, especially "environmentalist" concerns with timber management practices. Public concern over federal agency timber management practices is by no means restricted -- or even primarily interested in -- aesthetics. Different groups in society have different preferences about timber management, and the proper role of timber harvesting in land management, based on their interests (economic and noneconomic) in the public lands, their understanding of ecological relationships, and their dependence on public lands. By now one would have thought that the Bureau would have learned that timber management is an area of (legitimate) public controversey, and not a case of ignorant citizens who are not conversant with the wisdom of your professional dogma.

14. "Short Term Use Versus Long Term Productivity." The assertion on pg. VI-1 of the DEIS that timber harvesting is not a "short term use" because it is carried out continuously over time is a gross fallacy. Timber management is probably the archetypal example of what the Congress must have had in mind when it inserted the "short term use versus long term productivity" clause in NEPA. Logging trees for immediate economic consumption is clearly a short term use, and "long term productivity" is nothing more than a restatement of the concept of "sustained yield." Thus section VI should be devoted to a really fundamental question: Is the annual allowable cut set at a sustained yield level?

15. Relationship of BLM Land to Adjacent Non-BLM Land. The DEIS, particularly section II.K., does not discuss the relationship between BLM-administered land and adjacent non-BLM land. Particularly, the EIS ought to describe the problems and implications of intermingled federal-private ownership, such as the "checkerboard" O&C land pattern. This question relates, as has been mentioned

earlier in our comments, to such problems as clearcutting harvest prescriptions, recreational and/or wilderness use and/or experiences, etc. For example, if an adjacent area is under commercial timber industry ownership and has been recently clearcut, it might be foolish to let aesthetic considerations force shelterwood harvesting; on the other hand, if clearcutting on adjacent lands has caused excessive erosion and sediment loading in the watershed, the Bureau ought to carry out timber harvest very carefully to as not to exacerbate those conditions. Would you please include in the final EIS a section on the interrelationship, problems and implications of intermingled BLM-private land ownership.

16. Length and Organization of the Draft Statement. We realize that comments 16a- on the organization and length of EIS's are not really germaine comments on the environmental impacts of the Bureau's program. However, this DEIS is one of the most tortuously worded and organized we have ever waded through.

The strategy of discussing in each section the relationship between each of the 27 operational practices and each of the 11 environmental systems for each of the 16a- three subbiomes contributes to incredible, superfluous length. Given 6 sections, 27 practices, 11 environmental systems, and three biomes, you have a four-dimensional matrix of 5346 cells; and the DEIS seems to discuss each of those cells sequentially. Surely this is taking the Luna Leopold assessment matrix methodology to an illogical extreme!

This effort at overclassification also leads you into some real quagmires. For example, on pp. II-63-64 you take one zone (the "douglas fir," from the most common tree species) and try to break it down into two zones, "Sitka Spruce" 16c- and "Western Hemlock" even though the Sitka Spruce is less abundant in the "Sitka Spruce zone" than is the Western Hemlock. And then, of course, it is not at all clear if there is any relationship between this differentiation and the Bureau's timber management program.

And on pg. VII-8 you alledge that the loss of a historic site because of a logging operation would not be irretreivable, since the site could be restored. Apart from being excess thoroughness, this is not really right. The property of being 16d- "historic" is that the site or structure was the site or structure used in historic times; if a replica is built, it does not posess this property of being "historic." However, you need not get into this sort of quibbling--just say that logging may accidently destroy a historic site, and that that is irretreivable.

Lastly, for the final EIS may we suggest that you practice improved utilization by single-spacing the copy and deleting the repitious use of identical maps throughout the EIS. This will save the Bureau reproduction and mailing costs, and any minimal reader inconvenience will be offset by easier storage of a thinner document.

Summary and Conclusion. In general, we do not have a major objection to the timber management emphases reflected in the DEIS. We realize that the Bureau is under more stringent constraint to manage the O&C lands, really the primary concern of 16e- the EIS, for timber production because of the language of the O&C Acts. Our primary concern is that timber management be conducted (i) at no greater than a legitimate and reliable sustained yield level, and (ii) that adverse timber management practices be mitigated to the fullest extent possible.

Again, thank you for the opportunity to review and comment on the Bureau's timber management program.

We would like to receive two (2) copies of the final EIS.

Sincerely,

Paul J Culhane

Paul J. Culhane
Research Associate

cc: J.Thomas

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Public Lands Project
Evanston, Illinois 60201

Paragraph #	Response
1 and 1a	The calculation of the allowable cut for each sustained yield unit is accomplished by use of a computerized simulation model. The details of the allowable cut plan are, therefore, essentially set forth on computer printouts which in total constitutes a voluminous amount of information and data. Due to the bulk of the material and the fact that the information contained therein is highly technical and is not self explanatory, the inclusion of the detailed calculations as an appendix to the final environmental impact statement as suggested is not practical. A summary breakdown of the allowable cut levels for the thirteen western Oregon sustained-yield units is shown on Table I-4. The allowable cut levels for the remaining 17 units are aggregated by state and are shown in Chapter I(A) under the subtitle, Remaining Forests. The penalties for failing to meet reforestation requirements are dependent upon the magnitude of the failure and cannot be ascertained until such a time that the allowable cut is recalculated. There will not be a bonus for meeting a reforestation requirement since the allowable cut level is predicated upon meeting the requirement. The printouts from the computerized simulation model used in developing the allowable cut plans indicate that the gap between the annual cut and annual growth progressively closes over approximately a 70 year period at which time they will be the same i.e. 1.172 billion board feet. For the reasons cited earlier, it is impractical to attach these documents to the final impact statement.

Public Lands Project
Evanston, Illinois 60201
(Continued)

Paragraph #	Response
1 and 1a (con't)	Bureau policy does not permit the harvest of timber to exceed the sustained-yield level except following catastrophic events, such as fires or windstorms. However, when these situations do arise, either the timber sale level is reduced in suceeding years by the amount that was overcut or, dependent upon the magnitude of the catastrophe, the allowable cut is recomputed. In the latter case, a reduction in the allowable cut can occur since catastrophic losses are not included in its calculation due to their unpredictability. It is true that the allowable cut level is premised on carrying out certain management practices, e.g. reforestation, which if not carried out could result in a reduction in the cut when recalculated. However, if a situation arises where these practices could not be carried out during the decade because of limited funds etc., the annual volume to be harvested would be reduced accordingly and, therefore, the allowable cut level would not be affected when recalculated. In the Bureau's view the foregoing policies provide for complete adherance to the principle of sustained-yield.
2 and 2a	Bureau policy for clear-cutting is in accord with the Report by the Subcommittee on Public Lands (Committee on Interior and Insular Affairs United States Senate) entitled, Clearcutting on Federal Timberlands. These policy guidelines are included as Appendix D in the final environmental impact statement. The impacts, both favorable and adverse, of cutting practices on Bureau lands are described in the final environmental impact statement.

Public Lands Project
(Continued)

Paragraph #	Response
3 and 3a	The final environmental impact statement, Timber Management, neither totally fulfills the requirement of National Environmental Policy Act nor does it constitute justification to use chemical pesticides on a site-specific basis. As indicated in the preface to Chapter IV, the Bureau must comply with stringent requirements prior to on-the-ground actions. One of these requirements is that site-specific environmental analysis must be prepared for each pesticide project. This analysis includes the study of alternative control methods. Table I-10 which indicates the most commonly used chemicals and their function in the timber management program has been included in Chapter I. The summary you suggest would be exceptionally voluminous and, in our opinion, not essential to the subject environmental impact statement (EIS).
4	The concept of improved utilization is contained in Chapter I(B) under the major objectives and policies that guide the Bureau's forest management program.
5	Describing alternative or conflicting uses of Bureau-administered lands is, by in large, a function of the Bureau Planning System which is described in Chapter I(C) of the final impact statement. The planning process, which is a prerequisite to on-the-ground activities, is the Bureau's mechanism by which sound land a and resource use decisions can be made (e.g., to withdraw an area for its primitive values, withdraw for recreation area, classify for full or limited timber production, etc.,). Thus, alternative land and resource uses have been considered prior to proposing a timber management program.
5a	Table I-3 indicates that over 15,000 acres of O & C lands have been withdrawn for recreational purposes, including existing and potential camping and picnicking facilities. For further discussion related to recreational resources, we direct your attention to Chapter II (K and L).

Public Lands Project
(Continued)

Paragraph #	Response
5b	Currently, the Bureau has identified through the Bureau Planning System 128 separate areas, containing nearly 4 million acres in 9 western states which possess "primitive" values. Many of these areas would qualify for wilderness as defined by the Wilderness Act of 1964.
5c	Chapter IV (I,3) states that timber management activities in the de facto wilderness area of interior Alaska are to be deferred pending completion of land use planning. "Wilderness" designation will be a land-use alternative considered in the planning process and in formulating a land-use decision.
5d	Chapter, II has been revised to reflect these comments.
6	This paragraph has been deleted. Mitigating measures will be carried out, as necessary, to meet the requirements of the applicable laws listed in Chapter I(B).
7	Bureau timber sale contracts specify certain standards of performance, including environmental protection, which the operator (contractor) must meet. Thus, the contractor may select any one of several yarding methods which will meet the required performance level. In certain cases, the contract may identify special yarding areas, including the type of yarding practice which must be employed. Where deemed necessary, the Bureau may also modify contract procedures relative to the yarding system to be used. Such modification, however, must be justified and adjustments made to the contract purchase price (stampage values).
8	No, the intensive timber management program is in response to the various laws and regulations which charge the Bureau with the responsibility for maintaining a continuous, high-level supply of raw material from Bureau-administered lands. Bureau timber management responsibilities and objectives are discussed in Chapter I(B) and (D).

Public Lands Project
(Continued)

Paragraph #	Response
9	The Council on Environmental Quality guidelines for preparing environmental impact statements require identification and discussion of all reasonable alternatives, "including where relevant those not within the existing authority of the responsible agency". It is, therefore, our opinion that the cited alternative is within the framework of the Councils guidelines for identifying and discussing alternatives. Such identification and discussion, however, does not signify the Bureau's endorsement of the alternative.
10	This paragraph has been clarified. Employment figures shown relate to production from O & C lands.
11	Under most circumstances stump heights are not to exceed twelve inches. Further, stump heights are seldom a major problem for the contract administrator as industry utilization standards encourage severance of the tree near ground level. With respect to slash height, there is no arbitrary figure established since it will vary depending upon other management goals and objective. In certain instances, for example, "high" slash provides additional food and cover for wildlife. Conversely, slash along roadsides, scene areas, etc., often degrades aesthetics. Therefore, Bureau policy concerning slash height varies depending upon overall management objectives and goals.
12	Often, "speculative homesite" developments lie adjacent to Bureau lands. The Bureau is working in cooperation with state and local planning agencies to resolve undesirable development of lands not suited for residential use. Since this does involve private lands however, controlling development is,by-in-large, the responsibility of the local planning bodies.

Public Lands Project
(Continued)

Paragraph #	Response
13	The second paragraph, Chapter IV (j)(i)(b), has been deleted from the environmental impact statement.
14	We disagree. The Council on Environmental Quality guidelines state that "This section (Short-term vs. Long-term) should contain a brief discussion of the extent to which the proposed action involves trade-offs between short-term losses, or vice versa, and a discussion of the extent to which the proposed action forecloses future options." In other words, how does the production of timber not only affect future productivity of timber but, also, how does it affect long-term productivity of recreation, wildlife wilderness, watershed and other resource values. In our opinion, Chapter VI of the final environmental impact statement adequately and accurately states these trade-offs.
15	The relationship of Bureau-administered lands to adjacent lands is specified in Chapter I(E). As also indicated, the Bureau is consciously aware of the coordination and cooperation required with other land administrators in averting unsound forest management practices and environmental catastrophes.
16a, b, and c	The text has been revised, clarified and expanded to impart a better understanding of the timber management program and related impacts. Further, separate environmental impact statements will be prepared to cover the sustained-yield units in western Oregon. Also as indicated in Chapter I, the Bureau will prepare environmental impact statements for the timber management programs in the Coeur d'Alene District, Idaho and the Ukiah District, California. These impact statements will narrow the scope of material covered and provide indepth analysis of impacts on the local environment.
16d	Chapter VII (j)(4) has been revised to reflect this comment.

Public Lands Project
(Continued)

Paragraph #	Response
16e	Emphasis is placed on the timber management program since this is the purpose of the environmental impact statement - to identify and assess the impacts of timber management on the environment. For discussion relating to land use plans and multiple use, we direct your attention to Chapter I(C). Further, the allowable cut will not violate the principles of multiple-use and sustained-yield and adverse impacts of timber management activities will be mitigated to the fullest extent possible, consistent with the various laws identified in Chapter I(B).

CSU

Forest and Wood Sciences

Colorado State University
Fort Collins, Colorado
80523

May 5, 1975

Director (340)
Department of the Interior
Bureau of Land Management
18th & C. Streets, N. W.
Washington, D. C. 20240

Dear Sir:

Responding to your invitation of March 20, copy of which was addressed to the Department of Forest and Wood Sciences, I have reviewed the draft environmental statement for the BLM National Timber Plan and would like to offer a few comments. In general it seems to be a well prepared, comprehensive, study. Undoubtedly, there was considerable time and effort spent in its preparation.

It does fulfill most of the objectives outlined on page 1. It provides a general description of the BLM timber management program (objective 1,4) and it is a reference for environmental information (objective 3). The statement seems more than adequate in fulfilling these goals.

1- However, I feel that it does not, or should not, serve as a framework for individual statements on a district or individual forest level (objective 3). These will be the environmental statements which the local public will be reviewing -- often critically. These will be the statements which must be presented in a legal confrontation. Because of these possibilities or eventualities the format for individual statements should be modified somewhat.

2- Specifically, the alternatives should be presented and analyzed in text along with the proposed action. They should be clearly outlined so a definite comparison of the impacts could be easily derived. The report format whereby they are separated, chapter I-IV vs chapter VIII, makes this comparison difficult. Since this is a critical aspect of public review, it would seem that a framework constructed to allow ease of alternative comparison would be more appropriate.

Additionally, the alternatives considered should be viable alternatives. Courses of action such as no timber management (AH. VIIIA) obviously are not
3- realistic. Only those options which are definite possibilities and are worthy of spending the analysis effort should be included. The law (Section 102(2)(D)) requires the analysis of alternatives not analysis of plans that make the proposed action look better.

An approach which very clearly presents alternatives and impacts is
4- shown in Leopold, L. B., et al, A Procedure for Evaluating Environmental Input, Geol. Survey Cir. 645. It's a good checklist for preparers of statements and for public presentations.

I feel these modifications to the individual EIS would allow a better framework than the one presented in the general report.

I appreciate the opportunity to review this statement. Please let me know if I can be of any further assistance or if you have questions concerning my comments.

Sincerely yours,

David R. Betters,
Assistant Professor

dwc

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Colorado State University
Forest and Wood Sciences
Fort Collins, Colorado 80523

Paragraph #	Response
1 and 2	The format used in preparing the Timber Management environmental impact statement is standard with the Bureau of Land Management and approved by the Presidents Council on Environmental Quality (CEQ). Though subsequent impact statements prepared for Bureau timber management activities will not deviate appreciably from the basic required format, scope and indepth analysis type discussions will be focused on local situations, thus, eliminating the need for certain discussions of operating practices, environments, etc., not peculiar to local conditions. This should allow more ease of analysis by the public.
3 and 4	The Council on Environmental Quality (CEQ) guidelines specify that the "No Action" alternative be included in the discussion of alternatives. We believe the alternatives identified are consistent with guidance provided by CEQ.

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chec
Cascade Holistic Economic Consultants
3544 S.E. Washington, No. Six.
Portland, Oregon, 97214. 233-0544.

Economic analyses in Forestry, Geology & Urban Development.
Randal O'Toole
John Savage
Micheal James

March 28, 1975

Director (340)
Bureau of Land Management
Washington, DC 20240

Dear Sir:

This letter is in review of the Bureau's Draft Environmental Statement regarding timber management. CHEC is pleased that the BLM is writing environmental statements about its management programs, and we are glad to be able to review this one.

Comments here relate most specifically to BLM programs in western Oregon, the area in which CHEC concentrates its work. Many statements, however, may be applicable to BLM management elsewhere.

To summarize this letter, CHEC believes:

-that the evaluation of the impacts and alternatives to tractor logging in the DES are inadequate;

-that the Bureau's evaluation of the program's impact on vegetation diversity is incorrect--the DES claims a major favorable impact while CHEC feels there will be an adverse impact;

1- -that the investigation and description of the impacts of shelterwood logging in southwest Oregon is deficient;

-finally, that the discussion and evaluation of the allowable cut determination is lacking. CHEC presents evidence that the allowable cut in parts of Oregon is far too high, a subject which should be considered in an EIS like this.

Tractor Logging

The DES states, "...tractor are used most effectively for downhill skidding on slopes under 35%, and for distances less than 1500 feet" (I-53). We have no quarrel with this statement,
2- although we would like to note that at least one National Forest (the Mt. Hood) limits tractor logging to slopes less than 25%[1].

However, the above quote implies that the Bureau does not use

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[1] Interview, Joe Astleford, Forester, Mt. Hood National Forest, by writer in January, 1975.

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tractors on slopes exceeding 35%. This is most certainly not true: CHEC has observed sales and proposed sales where the BLM
3- has allowed or will allow tractor logging on slopes exceeding 60%*. As would be expected, erosion after such sales is well in excess of what it could be if other yarding methods were employed.

We have been told that the Bureau limits tractor logging not on the basis of a fixed slope percentage, but on the known stability of the soils on these slopes. However, BLM soils
4- maps are not of sufficient detail to map individual soil series, but map complexes of series'. Many times, one componant of a complex is very instable, yet because a second componant is stable, the Bureau chooses to tractor log.

This environmental statement is apparently failing to evaluate the impacts of tractor logging on steep slopes. It is also failing to consider the alternatives: cable and horse yarding. High-lead yarding, and on steeper slopes, skyline logging would
5- prevent much erosion which is presently being caused. Horse skidding is a very viable, but little used, alternative on gentle to moderately steep slopes in salvage, thinning and other sales. Presently, when such techniques are "not available" in a certain district, the BLM selects an undesirable substitute. Where environmental conditions warrent, the Bureau should insist upon proper yardin methods, or not make the sale.

Vegetational Diversity

On page III-15, the DES states that the timber management pro-
6- gram will have a "maximum favorable" impact on the diversity of vegetation. This is highly debatable.

The basis for this evaluation can be found on page III-9: "Timber harvesting will increase the diversity of herbaceous and other forms of vegetation following their invasion of cut-over areas." This incorrectly assumes that, if left wild, the timber stands reach and maintain climax. In reality, the natural forest is
7- ever changing, with disease, insects, windthrow and fire all contributing to a disruption of natural succession. Climax, if reached, may last a few centuries; the stages preceeding climax may take a millenia or more to run their course. For example, brushfields are known in southwest Oregon which are over 100 years.

The Bureau's progams will increase the frequency of disruption, but not the diversity. In fact, an adverse impact should be ac-
8- counted for the componant. The BLM plans to use mechanical and chemical means of brush control. It will plant a few coniferous species, but the numbers of cedars, spruces, hemlocks, yews and firs will diminish. Many hardwoods may also shrink in number.

*As consultants, CHEC must keep some data mentioned here confidential. If requested, we will ask our clients to allow us to supply details.

9 As noted on page I-41 of the DES, mixed stands are often "less susceptable to insect damage than pure stands". This is true for certain diseases, as well. By reducing the vegetational diversity, the BLM is risking socioeconomic losses as well.

10- Needless to say, the genetic improvement programs will further reduce the diversity of the forest in many areas. The Bureau does not plan to eliminate natural trees altogether, as has been done in agriculture, so the overall genetic base will remain broad. But many individual stands, planted with "improved" stock, will have a much narrowed genetic base. They will be more susceptable to many diseases and insects than natural forests.

11- All these things should be considered when studying environmental impacts. It is disappointing that the Bureau has not mentioned them.

Southwest Oregon Shelterwood Practices

12- On pages III-56-7 of the DES, it is stated, "Shelterwood cutting is often the only feasible way of obtaining early tree regeneration in many zones,...but is uncertain in (the) Mixed Conifer-Mixed Evergreen in southwestern Oregon". There is, unfortunately, no elaboration of this problem.

13- Elk Lumber Company (later Boise-Cascade) has been shelterwood harvesting in southwest Oregon since 1946. Most other companies, and the government agencies, practiced clearcutting until the mid-1960's. When it became absolutely clear that hundreds of acres weren't regenerating, the more responsible timber companies, along with the BLM, followed Boise-Cascades lead.

14- The Bureau had been clearcuttin regularly for close to fifteen years before they made the change. But while it is rather obvious when a clearcut fails to regenerate, no regeneration is expected in a partial cut for 20 to 30 years after the first cut. This explains the uncertainty.

15- Boise-Cascade is finding that many of their thirty-year-old shelterwood cuts are successfully regenerating, but the comparison is not valid. Most Boise-Cascade land is primarily in the Butte Falls area, receiving over 40 inches of annual precipitation. They are on deep, well-developed volcanic soils.

16- On the other hand, BLM has extensive amounts of land receiving only 20" to 40" of rain--for example, the Applegate River Valley. Soils are shallow to moderately deep, poorly developed, and very gravelly. Many slopes are covered with a "rock mulch", which would make regeneration difficult. Howard Mitchell, of the Medford Corporation, told us that he would never attempt to manage forests in the Applegate Valley[2].

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[2] Interview, Howard Mitchell, chief forester of the Medford Corporation, by the writer in August, 1973.

17- An area typical of this typr of land is Eagle Mountain, in section 21, T37S, R6W WM. In 1955, a part of this section was clearcut by the BLM. Despite plantings, a stocking survey in 1961 showed poor regeneration. In 1972, another, rather candid report declared the area unstockable (see Attachment A), and the area was "withdrawn" from timber management.

18- Of course, it is easy to criticize from hindsight. However, we do not want to criticize BLM actions of 20 years ago, but rather to insure that the same mistakes aren't made again.

19- The most recent BLM inventories[3] have classified all BLM land into one of a number of categories. The above mentioned clearcut was classed "Reforestation problem--inadequate moisture". So are many other south and west facing slopes in southwest Oregon. Typically, the slopes have cobblely, gravelly or rock mulch soils, very scattered old growth (50% or less by crown cover) and poor regeneration. At the same time, nearby north and east facing slopes have dense old growth and are classed "Non-problem commercial forest land".

20- It is the writer's opinion that much, if not all, of the land classed "inadequate moisture" should be withdrawn from management. Because these areas generally produce only 20 to 40 cubic feet per acre per year, the affect on the allowable cut will be minimal (but see below). The failure of the DES to examine the socioeconomic and vegetational impacts of continuing to harvest this land indicates a serious inadequacy of the report.

Allowable Cut

21- The BLM policies and procedures for determining the allowable cut are summarized on pages I-20 to I-27. However, the DES investigates neither the soundness nor the accuracy of these policies. Certainly, an allowable cut which is too high will have a major impact on the human environment, and this question deserves greater study.

The following subjects, relating to allowable cut, are discussed below:
- units of measure;
- genetics;
- inventory.

22- UNITS OF MEASURE--On page I-23, the DES says, "The unit of measure used in the allowable cut shall provide an accurate measure of the end product objective, i.e., sawlogs, pulpwood, etc." However, the next statement is almost contradictory: "Additionally, trends in efficiency in the utilization of trees harvested will be recognized in the allowable cut."

In reality, the utilization standards of most companies today are not entirely reflected by the BLM units of measure. Before 1962, the Bureau used the Scribner rule, which measured only those trees twelve inches and larger. Starting in 1962, the International rule was used, which includes trees as small as seven inches in diameter. At that time, the International rule did not provide "an accurate measure of the end product objective", since most companies did not use trees smaller than 11" or 12".

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[3] BLM Manual 5250 Intensive Inventories. Portland, Ore. 1974.

23- The switch to the International rule, then, was made to reflect "trends in efficiency". By the time the last old growth is liquidated, any company not using seven inch trees will fast go broke.

24- Today, many companies use some logs as small as nine or ten inches[4]. A few, such as Weyerhaueser, use logs four inches small, but such is the exception. It is important to realize that energy expenditures for converting trees into products increase almost exponentially as tree size decreases. With energy supplies becoming critical, past trends in increasing utilization may come to a halt soon.

25- A change from the International to the cubic foot rule, as suggested on page I-8, would shorten the rotation and increase the allowable harvest. Since so little mention of it is made here, it is to be expected that an environmental statement will accompany such a proposal.

26- GENETIC IMPROVEMENT--On page I-23, the DES says "The influence of present and future intensive management practices...shall be reflected immediately in the allowable cut when included in the timber management program. However, before any practice is considered for inclusion, it shall first be analyzed for environmental, technical and economic feasibility."

27- Of course, it is the purpose of an environmental impact statement to analyze such practices for environmental feasibilities. The fact that this report does not do so is one of its great failings.

28- The tree improvement program in western Oregon accounts for five percent of the allowable cut, even though not a single "improved" tree has been planted in the field. The analysis of its "technical feasibility" seems to have consisted solely of reading three technical reports, which are listed in the bibliography of "An Allowable Cut Plan for Western Oregon" [5,6]. Each technical report estimated what increase in growth might be possible from a tree improvement program. The estimates were added and divided by three, resulting in 11%, which figure was used by the BLM.

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[4] Interview, Roy Elmgren, chief forester of Boise-Cascade, southwest Oregon division, by writer, August, 1973.

[5] Interview, Karl Bergsvik, then Forester, Bureau of Land Management, by writer, July, 1973.

[6] USDI BLM, "An Allowable Cut Plan for Western Oregon", Portland, Oregon. March, 1970.

29- Of further significance is the fact that two of the reports discussed only the theoretical possible gains in Douglas-fir. No experiments have justified these estimates. The third report was concerned with loblolly pine, not native to the west.

30- It is true that the Bureau's tree improvement program was submitted to several forest geneticists for independent review. However, this was after the decision was made to increase the allowable cut because of the program. Moreover, one geneticist called the act of taking credit for the program "irresponsible"[7].

31- All of these things--and more--should be considered in an EIS. What are the socioeconomic impacts if the program fails? What are the ecological consequences if a Douglas-fir is breeded and widely planted which is readily susceptable to a particular disease or insect? A recent OSPIRG report outlines other questions to be considered[8].

32- INVENTORY--The BLM forest inventory, or any forest inventory, is the most basic componant of the allowable cut calculations. This inventory is only inferentially mentioned in the DES. On page I-21, it says, "The allowable cut shall only include forest land judged to be suitable and available for sustained timber production."

33- From this, it may be presumed that BLM timber stands are individually for their suitability and availability. Such a presumption would be wrong. Instead, a systematic sample of one acre out of every 1850 was made. An acre in the sample which was judged suited for sustained timber production was considered to represent 1850 such acres in the allowable cut.

34- There are many shortcomings to this system. For a detailed description, see the OSPIRG report mentioned previously. Briefly, the basic problem is that a high statistical error is created when dealing with various componants of the forest. For example, this type of inventory in one National Forest "found" that that there were 44,000 acres of roads in that Forest. In reality, only 12,000 acres of roads actually existed.

35- Such errors normally offset each other when the data is considered as a whole, but for intensive forest management, the data must be broken down into componants. What is the impact of using this type of survey, instead of stand by stand examinations, as the Forest Service is beginning to use?

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[7] Irgens-Moller, Helge, "Comments on BLM's Tree Improvement Program". Forest Research Labs, Oregon State U. 1972.

[8] O'Toole, Randal Lee, Timber Policies of the Bureau of Land Management in Western Oregon. OSPIRG, Portland, Ore. 1975.

36- Another inventory shortcoming which the DES fails to investigate is the method of measuring productivity. As indicated on page I-5 of the DES, harvests in a post-conversion forest must equal growth. Today's harvests in western Oregon, about 1,172 million board feet annually, are set in anticipation of an eventual growth rate of 1,275 million board feet per year. How accurate are these estimates of productivity?

37- Examination of present forest mensuration knowledge indicates that these estimates may be significantly too high. The estimates were made by measuring the site index in each plot of the inventory mentioned above. Site index, a measure of tree height at a given age, is only an indirect measurement of productivity. Due to the nature of tree growth, it is often accurate, and yield tables such as those in McArdle's Technical Bulletin 201[9] can be used to forest growth and productivity.

38- However, it has been found that in arid regions and regions of soil toxicity, the height growth of trees is not as inhibited as the diameter growth. In these areas, the fully stocked stands of McArdle's publication are but a dream.

39- Scientists at the Pacific Northwest Forest and Range Experiment Station used refined methods of productivity measurement in arid parts of eastern Oregon.[10] They concluded that previous estimates of productivity in those areas were over 20% too high.

40- The Experiment Station has designed a method of determining productivity for the BLM, which can be found in BLM Manual 5250, mentioned above. However, the Bureau is using this only to determine if sites meet the minimum productivity standard of 20 cubic feet per acre per year.

41- CHEC has conducted independant measurements on BLM land in southwest Oregon, an arid zone. In one location receiving 40" of rain, site index was found to overestimate productivity by 30%. On a site only 30" of annual precipitation, productivity was 70% below site index estimates. The methods used were the same as those found in Manual 5250. Since most of southwest Oregon, which contributes to about one-third of Oregon's allowable cut, receives under 40" of rain per year, it can be concluded that the allowable cut is far too high.

42- In view of the fact that local BLM officials are aware of most of these facts, the Bureau seems very remiss in not evaluating them in this environmental statement.

[9] McArdle, Richard E. The Yield of Douglas Fir in the Pacific Northwest. USDA Technical Bulletin 201. Washington, DC. 1937.

[10] MacLean, Colin D. and Bolsinger, Charles L. Estimating Productivity on sites with a low stocking capacity. Pacific Northwest Forest and Range Experiment Station. Research Paper PNW-152. Portland, Oregon. 1973

43- The criteria which are used to judge if the forest land is "suitable and available for sustained timber production" also need examination in this environmental statement. If improper land is included in the allowable cut base, unnecessary impacts will occur to the environment. BLM Manual 5250 details most of these criteria; only one of the most important will be discussed here.

44- The Bureau, as mentioned above, has a minimum productivity standard of 20 cubic feet per acre per year. This appears unmentioned in the DES, although it has been criticized by many. Land of this low productivity is usually the riskiest land in the forest to harvest. Among other problems are brush competition, rocky soil, proneness to erosion and in southwest Oregon, proneness to fire.

45- Moreover, it is generally considered that the greatest return in wood fiber can be made by managing only the lands of higher productivity. Interviews with several foresters indicates that the optimum minimum productivity lies somewhere between 50 and 100 cubic feet per acre per year.[11] In other words, by not manageing the low site land, and instead spending that money on more intensive management of the higher site land, BLM allowable cuts may increase.

46- Since, as stated on page VI-2 of the DES, "the natural balance is fragile in communities of low productivity", it seems that an extensive analysis into the possibilities of changing the 20 cubic foot definition is warrented.

Conclusion

47- Page one of the environmental statement states that one of the objectives of an environmental impact statement is to "provide the public and Bureau personnel with information to be used in evaluating alternative actions in terms of potential environmental impacts". The statement has not succeeded in doing this. It has provided a "basic and general description of timber management practices" used by the BLM. But in no way can it be considered a tool to be used in evaluating activites.

48- The DES has not studied any present practices in more than a mildly critical light, and many, such as inventory procedures, it does not discuss at all. Alternatives which in the past have been proposed to several important activities are not discussed, for example, to not take allowable cut credit for the tree improvement program. In some cases, as the tractor logging on steep slopes, the DES has failed to even identify the impacting agents.

[11] Interviews: Howard Mitchell, Medco Forester, August 1973 ("low site IV" or 80 cu.ft.); Roy Elmgren, Boise-Cascade Forester, August 1973 ("50 to 80"); C.W. Bingham, Weyco Vice President, May 1974 ("site IV or V"); and Gordon Robinson, Sierra Club forester, December 1974 ("80").

CHEC hopes that the questions we have raised here will be given full consideration in the final environmental statement. We also request that the Bureau send us a copy of that statement as well as others which concern BLM policies in Oregon as they become available.

Yours truly,

Randal Lee O'Toole

Randal Lee O'Toole
Staff forester

cc: The Honorable Mark Hatfield
The Honorable Robert Packwood
The Honorable Les AuCoin
The Honorable Robert Duncan
The Honorable James Weaver
Oregon Department of Environmental Quality
Friends of the Earth
National Resource Defense Council
Oregon Environmental Council
OSPIRG
The Sierra Club

enc: BLM memorandum dated 2-22-72
OSPIRG report re: BLM

Note to reader:

Cascade Holistic Economic Consultants (CHEC) submitted two attachments with these comments; (1) Bureau of Land Management Memorandum to Files, dated 2-22-72, concerning Jackson Creek Planting (Sec. 21, T37S., R6W., and (2) O'Toole, Randal Lee, Timber Policies of the Bureau of Land Management in Western Oregon, Osprig Reports, 1975. These documents are available for public inspection by contacting:

Bureau of Land Management
Division of Forestry (340)
18th and C Sts., N.W.
Washington, D.C. 20240

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Cascade Holistic Economic Consultants (CHEC)
Portland, Oregon 97214

Paragraph #	Response
1	Responses to these summary comments are provided in the following discussions.
2, 3, 4, and 5	Chapter IV has been revised to indicate that "tractor yarding is to be restricted to stable slopes and favorable soil types." Where slope stability or soil types are in doubt, the respective district soil scientists will be consulted prior to on-the-ground operations. This normally occurs during staff review of the environmental analysis prepared for each timber sale or other timber management activity. This chapter of the environmental statement has also been revised to indicate that "tractor logging will usually be restricted to slopes less than 35% as a practical maximum, except where the land consists of pitches and benches and where geologic conditions and soil types are favorable. We believe the impacts of tractor logging are adequately described in the final statement and that appropriate alternatives to tractor logging are discussed in Chapter IV, Mitigating Measures.
6, 7, and 8	The environmental impact statement indicates a "favorable-major" impact on vegetation diversity rather than the "maximum favorable" impact expressed in your comment. We further believe that the final impact statement is accurate in its assessment of impacts on vegetation diversity. We point out that the majority (80%) of western Oregon forests consists of old-growth timber (200 years+). This tends to support the assumption that timber stands tend toward and maintain climax, thus, substantially limiting vegetative diversity to those species characteristic of old-growth forest. Under intensive forest management, the distuption of this continuity through "frequent" stand entries will provide for greater vegetative dispersion. Diverse numbers of species will invade cutover areas. This is not to say, however, that the quantity of any particular species (as you indicate) may be diminished through intensive forest management and development. In fact, certain species may be eliminated entirely from an area or region (as indicated in the final EIS).

Cascade Holistic Economic Consultants (CHEC)
(Continued)

Paragraph #	Response
9, 10, and 11	Stand diversity (tree species composition) should not be confused with vegetational diversity (all plants comprising an area). Nevertheless, your comment does have merit and is supported by the final environmental impact statement.
	To offset the potential impacts of a narrowed genetic base resulting from the planting of genetically improved trees, the Bureau will maintain a sufficient parental base. Further, it is unlikely that genetically improved stock will be used for all sites, i.e. site classes 4 and 5. Shelterwood cutting and lands not available for timber production (e.g. buffer areas, scenic zones, streamside corridors, etc.) will also provide a a natural seed source which may supplement or "compete" with genetically improved plantings. Potential impacts of increased susceptibility to disease and insects may also be partially offset by increased tree vigor and health resulting from intensive forest management practices.
12, 13, 14, 15, 16, 17, 18, 19, and 20	As you indicate, the Bureau of Land Management has progressively favored shelterwood silvicultural systems over clearcutting in southwestern Oregon. In fiscal year 1975, for example, over 95% of the acreage harvested in the Medford District was by the shelterwood system. Except for road rights-of-way or salvage operations, clearcutting in the Applegate Valley was virtually non-existent. Because of the several advantages of shelterwood logging in southwestern Oregon, its use is likely to continue.
	"Inadequate moisture" may be the result of several or a combination of several meteorological and environmental conditions. It may be due, in part, to time, intensity, and amount of precipitation; depth, texture and structure of soils; slope and aspect; and type, density and height of vegetation. Because of these many variables, regenerative capacities of a particular parcel of land cannot be determined solely on the basis of average annual precipitation. Therefore, the Bureau will continue to intensively manage forest lands capable of sustaining continuous crops of commercial timber. Such management, of

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Cascade Holistic Economic Consultants (CHEC)
(Continued)

Paragraph #	Response
and 20	course, will be determined through the land use planning process described in Chapter I(C) of the final environmental impact statement.
21	Specific comments to these issues are discussed in our responses which follow.
22 and 23	The International Rule was first used by the Bureau in 1962 for the sole purpose of determining rotations. In that year, the Scribner Rule was used for calculating the allowable cut and not the International Rule as inferred in the comment.
	The allowable cut is premised on the assumption that by the time the old growth is gone on lands available for timber production, industry will be able to utilize trees down to 7 inches in diameter. The average sized crop trees for a given stand in the future will average anywhere from 12 to 35 inches dependent upon the site quality and the intensity of management to which the stand has been subjected. Unquestionably, industry will have to retool during the transition from large, old-growth trees to smaller, young-growth trees; however, this process is currently underway. Some companies may go out of business rather than make the necessary investments; however, this will be primarily due to factors other than "not using seven inch trees."
24	The Bureau is not aware of any study relating to energy consumption relationships between the milling of small and large logs and, therefore, cannot respond to the comment.
25	If the use of cubic feet is adopted when the allowable cut plans for western Oregon are updated, the environmental impact statements covering the sustained-yield units will address the change.
26, 27, 28, 29, 30 and 31	The allowable cut planning policies described in Chapter I(D) stipulate that the increased growth resulting from all intensive management practices included in the program shall be reflected in the allowable cut. The plan developed in 1970 assumed that the planting of genetically improved stock would begin in 1978, and the future increased yields from these trees were projected accordingly.

Cascade Holistic Economic Consultants (CHEC)
(Continued)

Paragraph #	Response
26, 27, 28, 29, 30, and 31 (cont.)	The 11 percent increase in yield from genetically improved stock is an average of the 7 to 15 percent gain cited in Robert Campbell's publication on "Recommended Traits to be Improved in a Breeding Program for Douglas Fir," Forestry Research Note No. 57, Weyerhauser Co., January 1964. A thorough search of the existing literature was made in 1970. Depending upon the particular publication reviewed, the projections for increased gains ranged from 3 to 25 percent. A summation of current thinking is contained in, "Intensive Management of Coastal Douglas Fir" by Curtis, Reukema et.al. of the Pacific Northwest Forest and Range Experiment Station. This publication states, "the potential improvement in volume-growth has been conservatively estimated at 10 percent for the first round and at least another 10 percent when progeny from known crosses becomes available as a seed source."
	If the program fails, it can be expected that timber production will be reduced for an extended period of time resulting in reduced employment along with accompanying adverse socio-economic impacts. Any major insect or disease infestations will further the impact in the form of disrupting ecological processes and causing environmental degradation. The magnitude of these impacts would depend upon the extensiveness of the infestations and the measures taken for their suppression or control.
32, 33, 34, and 35	A timber inventory which employed a method of systematic sampling was an important source of information for determining the suitability and availability of forest land for timber production; however, it was not the only source. Inventory data relating to other forest resources and values were utilized to the extent that they were available. All of the sources were collectively used in determining what lands were subject to timber harvest. It was recognized in 1970 that more detailed information was desirable and it was publicly stated at the time that the Bureau was initiating an intensive inventory program to acquire in-place information. This program which incorporates timber production

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Cascade Holistic Economic Consultants (CHEC)
(Continued)

Paragraph #	Response
32, 33, 34, and 35 (cont.)	capability classes and operations inventories for stand-by-stand examinations is now nearly complete, and the data will be used in updating the allowable cut plans for western Oregon.
36	The accuracy of the estimates of future productivity do not lend themselves to a statistical quantification since they are based on qualitative as well as quantitative projections.
37, 38, 39, 40, and 41	Due to certain of the factors mentioned, the Bureau in 1970 reduced the normal yield tables used in projecting the yields for future unmanaged stands (approximately 65 percent of the acreage available for timber production) by 30 percent. When the allowable cut plans are updated, these yield projections will be reanalyzed in light of the information contained in such publications as "Estimating Productivity on Sites With a Low Stocking Capacity", which was published since 1970.
42 and 43	The environmental impact statement is written on the premise that the allowable cut levels are accurate representations of the amount of timber that can be harvested in accordance with the principles of sustained-yield. As such, the mass of technical data relating to growth and yield projections used in calculating the allowable cuts is taken as a given. To attempt to write an environmental impact statement on the basis of "what if" the many different projections are individually or collectively too high or low would be a monumental task and, in the Bureau's judgment, an unjustified and meaningless exercise. To the degree that uncertainties or risks associated with the final impact statement, in terms of environmental impacts, it is felt that the EIS is responsive to NEPA.
44	The 20 cubic feet per acre per year criterion is a national standard for all forest lands. It is the "bottom line" figure, separating commercial forest land from non-commercial forest land.

Cascade Holistic Economic Consultants (CHEC)
(Continued)

Paragraph #	Response
45	Since the budget has not been a constraint in carrying out the practices associated with timber growth and harvest in western Oregon, the suggestion for increasing investments on high-sites would not increase the allowable cut for that region. For areas outside of western Oregon, the budget has served to constrain the allowable cut and, therefore, additional funds could increase it by some increment if all other variables were held constant. However, the suggestion is to concurrently remove lower-site lands from the timber production base which would result in the allowable cut being reduced in western Oregon and, in all probability, in the remaining forests as well.
46	The citation referred to applies to the productivity of the total ecosystem not just timber productivity.
47	We believe Chapter VIII (Alternatives) adequately describes the alternatives to the proposed action.
48	As previously indicated, we believe that the final environmental impact statement, Timber Management, apapropriately and accurately describes the Bureau's proposed timber management program. Further discussion of highly technical inventory procedures, as suggested, would not be essential to public understanding of the Bureau's timber management program.

Star Route Box 108-H
Winston, Oregon 97496
June 12, 1975

Director
Bureau of Land Management
Washington, D.C.

Dear Sir,

Enclosed is a reply to the Timber Management Draft Environmental Statement. We live adjacent to BLM O&C lands which are being currently intensively managed and consequently have direct experience with the problems and benefits of the BLM management programs. The level of environmental concern demonstrated by the BLM regional offices is atrocious. The BLM management of the O&C lands is scarcely distinguishable from that of the private land-owners whose management is notoriously poor. Many of the past and current BLM practices have long been forbidden by the U.S. Forest Service in adjacent areas. Recent logging of the O&C lands southwest of Roseburg constitute landscape alteration and has had profound effect on stream quality and slope processes.

We would appreciate receiving a copy of the final environmental statement and notification of any public meeting resulting from this or similar statements. We would especially like to receive a copy of the environmental impact statement on herbicide use.

Sincerely,

Dr. Alton S [illegible]
Ms. Leslie M. Johnson

Reply to Timber Management
Draft Environmental Statement

1. An option not seriously considered in the environmental statement is whether or not the old growth coniferous forests of western Oregon might have more value to the nation in their unaltered state as biotic reserves than as stands managed for wood production. As the earth's surface becomes increasingly dominated by mankind, examples of natural unaltered ecosystems become increasingly rare. The mixed coniferous forests of southwestern Oregon are unique in the world for their diversity and beauty. Most temperate areas of the world are dominated by deciduous tree species, leaving areas of extreme environment to coniferous species. Refuge areas where other species
1- than our own can continue to survive and live their life cycle are urgently needed. Many species of plants and animals require old growth stands for their survival. If all stands in western Oregon are put on 80 year rotation for timber harvest, there will not be any old growth stands for animal and plant habitat. What is a spotted owl, pileated woodpecker or flying squirrel worth in board feet? ¶ The management plans presented in the environmental statement assume current rates of construction and wood product use. It is possible that we as a nation should concentrate on rennovating existing housing rather than making new housing which would need replacement or rennovation in twenty years. This would mean a decreased need for lumber, especially structural lumber which provides much of the current market pressure for douglas fir lumber. If the nation decreases its lumber needs this would reduce the need to convert the forests of western Oregon to stands managed for wood production and would increase the relative value of other uses (biological reserve, research areas, recreational uses, wildlife habitat etc)

2. Assuming that at least some of the coniferous stands will be harvested, certain features of standard management practice need to be re-examined. It is considered desirable by foresters
2a- to have even-aged single species stands which are presumed to have maximal wood production potential. This requires clear-cut harvesting, and, in southwestern Oregon, virtually require hand re-stocking and brush control.

There is evidence, however, that even-aged single species stands are more prone to disease outbreaks (Forest Harvest-Regeneration Activities and Protection of Water Quality, EPA 1975). What will happen if all of western Oregon's forests are converted to young douglas fir and serious disease outbreaks occur? Mixed species stands provide less optimal conditions for the spread of pathogens for any one species because the pathogen must travel greater distances between susceptible trees.
2b- Mixed stands also provide much better insectivorous bird habitat. Insectivorous birds are probably responsible for maintenance of insect pests at low levels and preventing outbreaks. In order to maintain insectivorous bird populations, snags and rotten trees are necessary for nesting holes. Once again, conversion of the entire stand to an even aged uniformly vigorous growth will eliminate bird breeding habitat and render the stand vulnerable to insect outbreak.

"Hardwood conversion" is another management practice designed to maximize douglas-fir wood production. This seems undesirable for several reasons. First, some of these trees produce valuable lumber that is difficult to obtain and the furniture industry of this country would like to obtain these woods. Red alder, Oregon ash, bigleaf maple, western yew and Oregon myrtle are all woods of commercial value, not "weeds". In addition, at least the alder is extremely important in the 2c- maintenance of fertile forest soils because alders have nitrogen fixing bacteria in their roots. In an area of intense leaching and low soil fertilities such as western Oregon, this factor should not be ignored in long term management considerations. Finally, a study in western Oregon revealed that insectivorous birds prefer to excavate nest cavities in hardwood trees rather than conifers. Maintenance of a certain level of hardwoods in a stand is probably beneficial in insect control as well as providing higher quality wildlife habitat.

Clearcutting in southwestern Oregon is not advisable for several reasons (Forest Harvest- Regeneration Activities and Water Quality, EPA 1975 p.2-27). Firstly, it causes serious erosion/sedimentation problems (see discussion of slope stability and water quality below). Secondly, clear cuts are difficult 2d- to regenerate because heat and water stress in late summer and fall are extreme on most sites, resulting in high seedling and planted stock mortality. The stand tends to grow up to "brush" : Ceanothus species, manzanita, silktassel, madrone, chinquipin, etc. This seral stage may persist for some time before trees

are re-established. Some sites may require hundreds of years for natural reforestation. The forester then attempts to accelerate succession through herbicides and brush cutting with attendant 2d- ecological ramifications. Shelterwood harvesting or partial (cont.) or selective cut would obviate many of these difficulties. There is now accumulating evidence that clearcutting, especially in conjunction with slash burning, alters the soil such that the soil nutrients are lost. Slash burning also alters the soil structure and intensifies erosion. Through repeated cycles of harvesting, this could have a very serious impact.

A subtler concern regards the gene pool and potential response to different environmental conditions of the forest trees. If the young trees are genetically selected like crop species, and a few strains are propagated over wide areas, what will happen to the genetic diversity of the species? If a new disease or insect pest or a series of drought years occurs, what will be the ability of these high-production strains to withstand it? 2e- Experience with crops such as corn in the United States leads one to be cautious. Because of the genetic uniformity of the corn crop, serious losses occurred in the late 1960's due to a new disease. It took several years to develop and get into production a strain resistant to the disease. What will the losses be when the crop takes eighty years to mature?

2f- Routine road construction and harvesting procedures cause unacceptable damage to soil and water resources in southwestern

Oregon. The BLM forest lands in southwestern Oregon are located in the Coast Range and Northern Klamath geologic provinces. The dominant landform process in these areas is landslides. Many of the slopes are highly unstable and subject to mass movement upon disturbance either by road construction or logging alone. All quantitative studies on erosion and mass wasting in western Oregon have shown at least a five-fold increase in sediment yield following logging. Average rates have shown increases of between ten and 2f- (cont.) thirty times in annual sediment yield. Exceptional areas show 1000 times increase in erosion following road construction and logging. The Umpqua River, which drains much of the BLM O&C lands, has shown an eight-fold increase in suspended sediment since commercial logging was instituted. These changes of the stream regime are extremely deleterious to anadromous fisheries. Furthermore, similar logging practices in northwestern California are responsible for serious aggradation of rivers. These channel changes make the rivers more flood-prone and initiate widening of the channel with resultant destruction of downstream real estate. These processes are probably occurring in southwestern Oregon also.

It is likely that approximately 30% of the slopes in the BLM O&C lands are too unstable for standard logging practices. These slopes should be identified and inventoried. Rules for management of these areas should be prepared. The 5% of this area identified as critical slopes and watershed in the environ- 2g- mental statement (p. I-6) is a serious underestimate. In all areas road construction should be held to a minimum. The BLM should increase the proportion of areas employing skyline or high-lead yarding methods and decrease the use of tractor skidding as an aid to reducing soil disturbance and consequent erosion. Reduced use of broadcast burning will also alleviate problems of mass wasting and other forms of erosion.

3. It is beyond belief that a policy permitting cutting of three times the annual net growth can be called sustained yield. The most valuable stands with the highest yield per acre are now being harvested. These old growth stands will be completely cut in the next twenty-five years (p. I-1). Old growth stands now make up over 90% of the cut (p. I-5). After these stands are cut, what will be harvested? Assuming that sustained yield 3a- forestry began in 1938 with a cut of .5 billion board feet per year, these trees will be only sixty-two years old in 2000. The first harvest of second growth will not occur until 2020 and then at a lower level than the present cut. Yields approaching the present cut are not likely before 2030-2040 and only then if the most favorable assumptions of the BLM planners are fulfilled (e.g. eighty-three year rotation).

Justification of the present allowable cut by hypothetical growth in 2070 is absurd. There has not yet been a demonstration of eighty-three year rotation in southwestern Oregon. The assumption that even aged stands of single species will produce high 3b- yields of sawlogs over long periods of time is unjustified (see discussion under 2. above) If insect outbreaks, droughts, prohibitions of herbicide use etc. occur, an eighty-three year rotation will not be possible.

Dr. Allen S. Gottesfeld, geologist
Ms. Leslie M. Johnson Gottesfeld, ecologist
Winston, Oregon

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Dr. Allen S. Gottesfeld and
Ms. Leslie M. Johnson Gottesfeld
Winston, Oregon 97486

Paragraph #	Response
1	Five of the seven identified alternatives in Chapter VIII discuss various levels or intensities of timber management. The proposed action is a balance between the no timber program and the expanded timber management program and was identified through the Bureau Planning System described in Chapter I(C) as best fitting the demands and desires of the American People.
2a and 2b	Even-aged stands are also characteristic of shelterwood and seed tree silvicultural practices. Further, Douglas-fir is the predominant species on western Oregon BLM lands and is characterized by a patchwork of pure, even-aged stands even under natural conditions. This patchwork of varying age classes is one of nature's mechanisms in preventing the spread of pathogens even in areas where there is little vegetative species diversity. For further data relating to even-aged timber management, we direct your attention to an article by R. W. Stark entitled "The Entomological Consequences of Even-Age Management." This article appears in Oregon State University Paper 848, March 1973.
2c	Planned hardwood conversion will be restricted to red alder stands. Stand conversion, however, will not be applied to hardwood stands in drainage bottoms or along streams. These sites are more valuable for red alder and they also protect stream quality, fisheries, and furnish habitat for insectivorous birds. Generally, the stands being converted are on sites which were encroached upon by red alder following logging, fire or disease and insect outbreaks. Under natural conditions, these stands would convert to confer stands anyway as they are not true red alder sites. Conversion will be over the next 60 years and immature trees will be left until they attain merchantability thereby producing a financial return. We are not planning on eliminating all hardwoods from our stands.

Dr. Allen S. Gottesfeld and
Ms. Leslie M. Johnson Gottesfeld
(Continued)

Paragraph #	Response
2d	Over 95% of the total acreage harvested in the Medford District of southwestern Oregon is by the partial cut system. Clearcutting is used only in those areas where regeneration with tree species can be accomplished within 5 years or where natural catastrophies necessitate application of clearcut methods.
2e	Genetic diversity will be accomplished by maintaining a base of approximately 1,800 individual parent trees. Natural seeding from buffer strips, partial cut areas, reserve areas, and other timbered lands not available for timber production will also add to the genetic diversity.
2f	We believe the impacts of logging road construction and the mitigative measure which will be employed are adequately described in Chapters III and IV respectively.
2g	Data contained in the final environmental impact statement, relative to unstable slopes, is the most current. However, reinventory and further analysis of land classification and operability is continuing. As new data becomes available it will be processed through the Bureau Planning System described in Chapter I(C). Further, as indicated in Chapter IV of the final impact statement, the Bureau will limit road construction to that necessary for proper forest development. Other mitigative measures, similar to those you refer to, are contained in Chapter IV of the final impact statement.
3a and 3b	As pointed out in the statement, the reason for the annual allowable cut being three times the annual growth is because of the preponderance of old-growth stands in western Oregon which have zero to negative growth rates. That is to say, the annual mortality equals or exceeds the annual wood-growth of the surviving trees. However, the projections made by a computerized simulation model indicate that the gap between cut and growth progressively closes until they are the same (i.e., 1.172 billion board feet) in approximately 70 years.

Dr. Allen S. Gottesfeld and
Ms. Leslie M. Johnson Gottesfeld
(Continued)

Paragraph #	Response
3a and 3b (cont.)	While the preponderance of the forest lands support old-growth stands which are to be harvested over the next several decades, there is a considerable acreage presently comprising mature stands 80 to 190 years in age. These, along with presently immature stands that will reach maturity by the year 2000, will be subject to cutting beginning in that year. In the interim, some of these stands will be harvested along with immature trees that will be cut in the course of commercial thinnings. Actually, some of these types of lands are undergoing final harvesting or thinning now, the amount of which will increase over time. The rate of increased second-growth timber harvesting will be regulated to offset future reductions in old-growth timber harvesting in order to sustain the current allowable cut level. Due to the lengthy period necessary to grow crop trees and to insure a sustained-yield of timber harvest, it is necessary to make growth projections for the year 2070 and even beyond. These projections are made on the basis of the best information available and include research efforts, operational testing and experience, and data derived from measurements taken on unmanaged natural stands. While there has not been a demonstration of eighty-year rotations in southwestern Oregon, the Bureau feels it has adequate information available to project the yields from these lands 80 years into the future. It can be reasonably expected that time will show that these projections are not 100% accurate. However, as new information is gained and new technologies evolve, the projections will be modified and the allowable cut adjusted upward or downward accordingly.

April 28, 1975

Mr. Curt Berklund, Director
Bureau of Land Management
Washington, D. C. 20240

Dear Mr. Berklund:

After thoroughly reviewing the Bureau of Land Management, DES 75-10, Timber Management, I strongly urge BLM to continue its vigorous pursuit of the current timber management program. If any alternatives or changes are to be made, they should amplify the phrase in Section I, (pg. 5) which states; "Consequently, based on the current timber management plan the annual allowable cut will increase over time until it equals the annual growth of 1.275 billion (board feet) and remain stable thereafter".

1- Using the various fiber demand projections for years 2000 and beyond, BLM should most carefully review now and annually, the earliest opportunity to reclassify the 108,000 acres of forest land not now available for timber harvest due to critical watershed and fragile site conditions (Section I, pg. 6).

2- Section II, (pp. 106 and 107) accurately points out the economic impacts for mankind along with his need for products derived from the forest. While it is important for BLM to consider carefully the myriad of life forms and ecosystems on lands in its stewardship, the priorities must begin with mankinds longterm interests first.

3- A restatement in Section IV (pg. 4) should be made in positive context that shallow, fragile soils less than 20" will have cutting practices consistent with site conservation. Citing a definite soil depth is capricious and should better be left to the land manager and his field evaluation.

4- Section IV, (pg. 5) -- Aerial systems of logging should not be given first but rather last consideration, contingent upon the site and local criteria. In all instances, the most economical harvesting systems consistent with sound land management should be selected.

5- Rock quarry criteria favoring larger pits and longer hauls may not be defensible in terms of conserving fuel and economic analysis when more frequent, smaller pits closer to end use is the alternative. See Section IV, (pg. 11).

6- Section IV, (pg. 22) -- Buffer strips may be adequate with shrubs alone, not as stated "trees and shrubs".

7- Section IV, (pp. 22 and 23) -- It may be instructive to add "harvesting" or "yarding" to the sentence; "It is important that debris be removed from stream channels". This would differentiate from natural debris found in the stream which, if removed, may cause bank erosion or siltation.

8- Section IV, (pg. 51) -- Buffer strips of uncut trees along roads may not be aesthetically pleasing to everyone as well as present a potential blowdown situation. Alternate management techniques of smaller clearcuts, shelterwood or alternate strips is a more honest approach to management and public recognition.

9- Visual management should never become an excuse for some lesser level of timber and land management. Timber management and cutting practices reflecting full aesthetics should be completely compatible.

Section VIII Alternatives.

At best, the three alternatives selected for display to current timber management are academic exercises. While BLM must consider some alternatives, there appears to exist some degree of misinterpreted impact.

10- A program of Reduced Timber Management (-35%) yields .762 billion board feet of annual cut. This would definitely not be of Favorable-Major Socio-Economic impact! The alternative would result in a reduction to 18 Western Oregon Counties of $12.95 million dollars in O&C timber payments in lieu of taxes. This is based on 1972 data from the draft statement Section II, (pg. 106). The attendant employment losses and social impact would be major and felt severely in all Oregon cities, Portland and Salem included, as shown in Section II, (pg. 105).

11- Similarly, it must be argued that a Three-Phase Shelterwood (or partial-cut system) would NOT be of Adverse-Minor impact in the Socio-Economic component. "... some dislocation for the logging industry.", will have an economic shock effect similar to a Reduced Timber Management Program. The same cities cited above will be effected with economic and real ghost towns to follow elsewhere.

12- As logging costs would increase in a Three-Phase Shelterwood, either the consumer or converter would bear the cost of inefficiency. It is only a matter of short or long range economics that the consumer would be the ultimate payer. This alternative is neither good scientific nor advisable logging management. The unfavorable shade, if it did allow growth for Douglas fir would subject young trees to subsequent damage of recurring entry to partial harvest. The price to pay for doubtful aesthetics is too high.

13- The comparative displays of Environmental Components, Impact and Magnitude are not directly displayed between the Current Program and Three Alternatives. These should all be made in one section of the DES, preferably in the front summary, or on one sheet, as attached. Only in this manner can a reader effectively determine better effects.

Thank you for this opportunity to comment and to aid in improved timber management to any degree.

Sincerely yours,

Gerald Gruber
Gerald J. Gruber
Forester

GJG:cas

att.

BLM-DEIS TIMBER MANAGEMENT
Analyses Summary *

Environmental Component	Favorable-Major	Adverse-Major	Favorable-Minor	Adverse-Minor
Aesthetics and Human Interest	B, D	A, C		
Air			B, D	A, C
Ecological Interrelationships			B, D	A, C
Recreation (General)			B, D	A, C
Recreation (Fishing)			B,	A, C, D
Recreation (Hunting)			C,	A, B, D
Soils			B,	A, C, D
Vegetation (Health and Vigor)	A,	B,	C,	D
Vegetation (Diversity)	A, C			B, D
Water (Quality)			B,	A, C, D
Water (Yield)			A, C	B, D
Wilderness Experience	B,	A, C		D
Wildlife (Raptors, Large Predators)			B, D	A, C
Wildlife (Herbivores)	C,		A,	B, D
Wildlife (Aquatic)			B,	A, C, D
Socio-Economic	A, C	B		D

* Programs:
Current Timber Management of 1.172 MMM Annual Allowable Cut = A
No Timber Management = B
Reduced Timber Management (-35%) of .762 MMM Annual Allowable Cut = C
Three Phase Shelterwood or Partial Cut = D

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Gerald J. Gruber
Eugene, Oregon 97405

Paragraph #	Response
1	Forested lands currently excluded from the timber production base will be continually reevaluated through the Bureau Planning System. Where better knowledge or improved technology permit intensive forest management on these excluded lands without significant environmental impact and where such management is consistent with multiple-use goals, these lands may be included in the timber production base.
2	The Bureau's forest lands will be managed consistent with the principles of multiple use and sustained yield. This includes "products" other than timber.
3	This paragraph of Chapter IV has been revised to consider your comment.
4	To avoid unacceptable impacts to the physiography, geology and minerals under the situation cited, aerial systems will be given first consideration. We believe this statement is also consistent with your view regarding "most economical harvesting systems consistent with sound land management . . .".
5	This paragraph is pointing out that consideration should be given to larger pits with the goal of minimizing erosion problems associated with many small pits. The Bureau is not stating that only larger pits will be developed and utilized.
6 and 7	Chapter IV has been revised to reflect these comments.
8 and 9	Chapter IV(J)(1)(a) has been revised to reflect more recent Visual Resource Management techniques. The use of buffer strips will continue; however, their application will be determined through the concept of managing the timber and visual resources in harmony with each other.
10 and 11	Chapter VIII has been revised to reflect these comments. The "Impact Summary" charts for selected alternatives and the proposed action have been consolidated for comparison purposes (Table VIII-1).

Gerald J. Gruber
(Continued)

Paragraph #	Response
12	The display of this alternative does not imply the Bureau's endorsement or lack of endorsement. The impacts you describe are recognized in the EIS.
13	A comparative display of this nature is included in Chapter VIII (Table VIII-1).

4000 4th Avenue, North
Great Falls, Montana
59401

Director (130)
Bureau of Land Management
Department of the Interior
Washington, D.C.
20240

April 22, 1975

Dear Sir;

I oppose the current draft timber management plan as an overt attempt to overcut our nation's forest resource. It is apparent from the statement that the BLM identifies most conflicting values
1-but the statement seems to assume that timber values are superior to all other resource values. The draft statement further fails to consider the relative value of forested land for uses other than timber harvest, preferring to consider timber harvest as valid for all timbered areas, instead.

In view of these major flaws in the timber management plan, it becomes imperative that the BLM rewrite the statement to provide
2-the necessary considerations for other resource values. Needless to say, the result of such rewriting will be at least a major reduction in both timber harvest and roadbuilding. Anything less will only serve as further proof that the current Administration is willing to risk long term security for short term economic growth.

Sincerely,

Thomas E. Horobik
Thomas E. Horobik

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Thomas E. Horobik
Great Falls, Montana 59401

Paragraph #	Response
1 and 2	As stated in Chapter I(C), "A timber management program for a given forest is the outgrowth of a process known as the Bureau Planning System which is used to develop and maintain land use plans for all Bureau-administered lands." Although the environment impact statement, Timber Management, is not for a specific forest, it does represent a composite of many individual timber management programs that have been derived through the Bureau Planning System. This planning process is briefly described in Chapter I(C). In reviewing part C of Chapter I and Figure I-3 and 3a, please note that the timber resources are considered equally with other resource values in making land use decisions.

29 APRIL 1975

340

DIRECTOR
BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR
WASHINGTON, D.C., 20240

DEAR SIR

REF: DRAFT ENVIRONMENTAL STATEMENT--TIMBER MANAGEMENT PLAN, INT DES 75-10

1- I AGREE WITH THE PROPOSED STATEMENT AS WRITTEN. THE TAIGA FORESTS IF THEY QUALIFY FOR WILDERNESS STATUS SHOULD BE GIVEN EVERY CHANCE TO BECOME WILDERNESS.

THANK YOU

Harry E. Wilson

HARRY E. WILSON
2120 NORTH CALLOW AVENUE
BREMERTON, WASHINGTON 98310

BUREAU OF LAND MANAGEMENT RESPONSE TO COMMENTS FROM:

Harry E. Wilson
Bremerton, Washington 98310

Paragraph #	Response
1	Bureau planning programs in the state of Alaska will provide opportunity for "wilderness" designation. Land use decisions, however, are currently dependent upon adjudication of land selections under the Alaska Statehood Act and the Alaska Native Claims Settlement Act.

X. GLOSSARY

Adverse Location: Areas of productive forest land often having merchantable stands of timber but which, because of physical location, are impossible or difficult to harvest. An example might be a small stand of timber on a shelf down in a canyon or on a steep, inaccessible mountainside.

Afforestation: The establishment of a tree crop on an area from which it has always or very long been absent.

Allowable Cut: The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

Alluvium: Soil, sand gravel or similar detrital material deposited by running water.

Anadromous Fish: Fish that move from a salt water or estuarine environment into freshwater streams to complete spawning and reproduction.

Andesite: An extrusive, dark-grayish rock.

Annual Cut: Amount of timber, usually measured in board feet, harvested annually.

Anticline: An upfold or arch of stratified rock in which the beds or layers dip in opposite directions from the crest.

Apron: A concrete, rock or other resistent material placed or constructed under the outlet end of a culvert to prevent a scouring type erosion action.

Aquifer: A water-bearing bed or stratum of earth, gravel or porous stone.

Archaeology: The scientific study of the physical aspects of cultural resources in order to describe and explain former ways of life.

Backfire: A fire set along a control line to consume the fuel in the path of a forest fire and/or change the direction of force of the fire's convection column.

Basalt: A dark-gray to black, dense to fine-grained igneous rock.

Bareroot (Stock): Seedlings lifted from a nursery and transported to the field for transplanting. Roots of seedlings are "cleaned" of growing medium (soil); naked root; free of soil.

Base Course: Lower layer(s) of a surfacing structure consisting of crushed gravel or stone, crushed sandstone, pit-run rock, bank or river-run gravels, etc., to provide support and, in the event no surface course is placed, the running surface for traffic load.

Batholith: A large mass of intruded igneous rock, which stopped in its rise below the surface.

Berm: An elongated ridge or "windrow" of soil or other material.

Biomass: The total mass or amount of living organisms in a particular area expressed quantitatively.

Biome: The largest land community unit (plant and animal) which is convenient to recognize.

Biota: The flora and fauna of a region.

Blading: Process of smoothing sub-grade or surface of road, ditches, etc.

Board Foot: The amount of timber equivalent to a piece of wood 1 foot by 1 foot by 1 inch thick, being the unit in board foot measure.

Breccia: A rock composed of angular fragments cemented together and and volcanic in origin.

Broadcast Burning: Intentional burning in which fire is intended to spread over all of a specific area. It may or may not qualify as prescribed burning.

Browse: Tender shoots, twigs and leaves valuable as wildlife food.

Buck: To cut the tree into log lengths.

Buffer Strip: A protected area that separates the timber cutting unit from the object or thing to be preserved.

Burning Out: Intentionally setting fire to fuels inside the control line to strengthen the line.

Butt Rigging: Various combinations of swivels, shackles, links or straps that permit connections between main and haulback lines without kinking or tangling.

Cadastral Surveying: Determining and laying out the boundaries of parcels of land for defining individual ownerships.

Calderas: A large basin-shaped volcanic depression more or less circular in form.

Canopy: The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Carrion-Feeding Predators: Animals that feed on dead and putrefying flesh.

Cavity Nesters: Birds and animals that live in holes or openings in trees, snags or cliffs.

Chipping: Converting woody material (i.e., logs) into wood chips by mechanical means.

Choker: A noose of steel cable or a loop of chain, that is tightened round a log and terminates in a hook or other fastening device enabling the log to be firmly gripped for skidding.

Cirque: A steep-walled amphitheatic recess in a mountain created by glaciation.

Clearcut: Removal of an entire standing crop.

Climax: The culminating stage in plant succession for a given environment, the vegetation being conceived as having reached a highly stable condition.

Closure: Legal restriction, but not necessarily elimination, of specified activities such as smoking, camping, or entry that might cause fires in a given area.

Commercial Forest Land: Forest land which is producing or capable of producing the 20 cubic feet per acre per year and not withdrawn from timber utilization.

Commercial Hardwoods: Hardwood tree species, such as red alder, myrtlewood, etc., which are saleable or have market value.

Commercial Thinning: Removal of merchantable surplus trees.

Conflagration: A raging, destructive fire. Often used to connote such a fire with a moving front as distinguished from a fire storm.

Conifers: Trees and shrubs, mostly evergreens, usually bearing true cones, i.e., pines, firs, cedars and spruce.

Containerized Seedlings: Young trees grown in plastic or fiber containers from seed. Containers may be planted along with seedling.

Critical Watershed: Areas within the forest zone and sites above the 20 cubic feet per acre per year productivity level; but, because of unstable soil and other conditions, they cannot be logged without seriously affecting the watershed.

Contrast Rating: A method for determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature.

Crown Fire: A fire that advances from top to top of trees or shrubs more or less independently of the surface fire.

Crustacean: Arthropods, including lobsters, shrimps, crabs, etc.

Cull: Any item of production, e.g., trees, logs, lumber, picked out for rejection because it does not meet certain specifications.

Cultural Resource: A historic or architectural, ethnic, or prehistoric site, area, structure or object utilized by man.

Culvert: A pipe, pipe-arch, or box structure constructed of metal, concrete or wood which provides an opening under the roadway primarily for the conveyance of liquids, pedestrians or livestock; exclusive of bridges.

Deck(ing): Log storage or holding area; "store" logs in piles; a pile of logs.

Defoliator: An insect that strips vegetation of leaves or foliage.

Dibble: A tree planting device.

Dikes: Thin, tabular masses of igneous rocks formed by the injection of molten rock into fissures and joints in rocks.

Direct Method: A method of suppression that treats the fire as a whole, or all its burning edge, by wetting, cooling, smothering, or chemically quenching the fire or by mechanically separating the fire from unburned fuel.

Disabling Injury: An injury which does not permit an individual to return to his next normal, full-work shift.

Disclimax: A biotic community maintained by man or his livestock.

Drumlins: Elongated hills formed from glacial drift.

Duff: The partly decayed organic matter on the forest floor.

Ecology: The study of the relating of organisms or groups of organisms to their environment.

Ecosystem: An area of nature that includes living organisms and nonliving substances interacting to produce an exchange of materials between the living and nonliving parts.

Edge Effect: An area where the types of food and cover are more diverse thus creating a more favorable wildlife habitat, i.e., meadow abutting forest or logged area adjacent to or surrounded by "natural" vegetation.

Ejecta: Material ejected, as from a volcano.

Endangered Species: Those plant and animal species determined by the Secretary of the Interior to be threatened with extinction.

Endhaul: Process of hauling excess material from area of construction to another area.

Ephemeral Stream: A stream that flows only briefly during and following a period of rainfall in the immediate locality.

Eskers: Ridges of stratified glacial drift formed by glacial streams under the ice or in fissures.

Estuary: Area where the sea tide meets and mixes with rivers or streams.

Eutrophication: The "aging" of a body of water (usually a lake) from a "sterial" (nonbiolobic) condition to one biologically overloaded (usually indicated by algas blooms) as a result of nutrients and time; the eutrophic water bodies have lowed oxygen levels for fish.

Evapotranspiration: The total loss of water vapor to the atmosphere by vegetation and soil, on a unit area basis.

Even-Aged Stand: All trees are the "same" age or at least of the same age class.

Fairlead: A device, containing, pulley wheels or rollers, whereby the winch can pull in the cable from any direction.

Falling/Felling: The act of cutting down trees.

Fault Block: Uplifted blocks of land, i.e., mountains, with faults on two or more sides.

Fauna: Animal life.

Filter Strip: Like a buffer strip, a protected area left for the purpose of filtering out sediments.

Fingerling: A small fish.

Fire Control: All activities to protect wild land from fire. (Includes prevention, presuppression, and suppression.)

Fire Retardant: Any substance that by chemical or physical action reduces flammability of combustibles.

Firebreak: A natural or constructed barrier utilized to stop or check fires thay may occur, or to provide a control line from which to work. Sometimes called a fire lane.

Fireline: The part of a control line that is scraped or dug to mineral soil. Sometimes called fire trail.

Fiscal Year: Uniform period between one annual balancing of financial accounts and the next.

Flora: Plant life.

Forage: Food for animals.

Forb: An herb other than grass.

Forest Land: Land which is, formerly has been, at least 10 percent stocked by the forest trees, and not currently developed for nonforest use.

Fragile Site Condition: An area of ground susceptible to damage the to soil, geologic, climatic or other conditions.

Fry: The young of fishes.

Fuel Break: A wide strip or block of land on which the native vegetation has been permanently modified so that fires buring into it can be more readily extinguished. It may or may not have firelines constructed in it prior to fire occurrence.

Gabion: A device used to dam up water. Usually it is a wire cage filled with rock or earth.

Genera: Of genus; a group of related species, class, order, kind, sort.

Girdling: Making more or less continuous incisions around a living stem through at least both bark and cambium, generally with the object of killing the tree.

Grading: Process of making sub-grade level or slope evenly for roadway.

Grubbing: The removal of roots, stumps and other similar debris from a specified area, i.e., a road right-of-way.

Hardwoods: A conventional term for the timber of broad leaved trees, and the trees themselves belonging to the botanical group Angiospermae.

Hazard: A fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition or of suppression difficulty.

Harard Reduction: Any treatment of a hazard that reduces the treat of ignition and spread of fire.

Heart-Rot: Degeneration of innermost (heartwood) woody material caused by heart-rotting fungi; a disease of trees.

Herbaceous: Of, relating to, or having the characteristics of an herb; having little or no woody tissue and persisting, usually, for a single growing season.

Historic: From roughly 1800 A.D. to the present.

Hogback: Sharp ridged hill or mountain.

Hydrology: The study of the circulation of water in and between the atmosphere and the earth's crust.

Igneous Rock: Rock formed from the solidification of a liquid mass.

Indirect Method: A method of suppression in which the control line is located along natural firebreaks, favorable breaks in topography, or at considerable distance from the fire; and the intervening fuel is backfired or burned out.

Indurated: Hardened.

Intensive Timber Management Practices: This is a group of practices used to improve growth of the forest on desired trees. These practices are commercial thinning, precommercial thinning, mortality salvage, intensive reforestation, genetic tree improvement, brush and hardwood control, and conversion of hardwood stands to conifers.

Intermediate Cuttings: Any harvest of merchantable material from a stand which occurs prior to the final harvest cutting (i.e., precommercial thinning, sanitation salvage, preparatory cut).

Intermittent Stream: A body of flowing water which does not flow all year around.

Jammer: A light-weight, two-drum winch with a wooden spar used for both skidding and loading of logs.

Landing: Any place on or adjacent to the logging site where logs are assembled for further transport.

Leaching: The removal of soluble substances from the soil by percolating water.

Limited Cutting (Area): Acres on which full growth potential of trees is not realized due to lower levels of intensive timber management. Growth is forgone in favor of other resource values.

Logging: The falling and extraction of timber, particularly as logs.

Lop and Scatter: Cutting branches, tops and small trees after felling, so that the resultant slash will lie close to the ground; to cut limbs from felled trees.

Low Site: Forest land incapable of producing 20 cubic feet of useable wood products per year.

Macadam: A type of pavement construction using a coarse aggregate of uniform size usually of crushed stone, slag or gravel.

Mainline: The operating line, yarding line, main cable; the cable that does the actual hauling.

Management Framework Plan (MFP): Land use plan for national resource lands which provides a set of goals, objectives and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

Matrix: A rectangular arrangement of various elements into rows and columns.

Mattock: A digging tool with a stout hoe blade used for planting trees.

Metamorphic Rocks: Rocks changed in form or character through extreme heat and pressure.

Migratory Fish: Both freshwater and anadromous fish that have migratory habits as part of the biology of the species.

Monoculture: Raising crops of a single species, generally even-aged.

Moraine: Unstratified deposit of materials dropped at the edge, sides and bottom of receding glaciers.

Mortality Salvage: (See Sanitatiion/Salvage Cutting).

Multiple-Use: Management of natural resources in such a manner so as to fulfull two or more objectives of management, i.e., production of timber, wildlife and recreation.

National Register of Historic Places: A list of cultural resources of national significance, maintained by the Department of the Interior.

Non-Commercial Forest Land: Forest land not qualifying for commercial forest land.

Non-Commercial Hardwood: Areas stocked with non-commercial hardwood trees and which are not now and show no evidence of ever having been stocked with trees of commercial species and quality. Examples of hardwood species are oak and madrone.

Non-Commercial Rocky: Areas that cannot be managed for continuous crops of timber since stocking cannot be improved and regeneration is difficult. Areas within the main forest zone that consist of steep, rocky terrain with cliffs, talus slopes, and large boulders where the harvest of trees is impractical. Includes areas of largely rock outcrop with trees in soil pockets.

Non-Forest Land: Land not qualifying as forest land. Includes land that has never supported forest growth and land once forest land now developed for nonforest use.

Off-Road Vehicle (ORV): Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swamp land or other terrain.

Orographic: Pertaining to mountains, as orographic lifting of an air mass.

Overstory: The uppermost vegetative "layer" of a forest (usually trees).

Partial Cutting: Tree removal other than by clearcutting.

Pathogen: A specific causative agent of disease.

Peneplain: A region that has been eroded to very gently slopes by streams.

Perennial Stream: A body of flowing water which flows all year around.

Permafrost: Permanently frozen ground.

Pesticides: Any chemical preparation used to control populations of injurious organisims, plants or animals.

pH: The negative logarithm of the hydrogeni on activity.

Phytoplankton: Planktonic plant life (See Plankton).

Pingo: A relatively large mound raised by frost action above the permafrost and generally persisting for more than a single season.

Plankton: The passively floating or weakly swimming, usually, minute animal and plant life of a body of water.

Planktonic: Plankton like (See Plankton).

Plug: The solidified mass of igneous rock filling a vent or pipe of a dead volcano.

Precommercial Thinning: Removal of surplus trees in a stand prior to reaching merchantability.

Preparatory Cutting: Initial stand entry in shelterwood cutting system; first of a succession of two or more cuts which prepares stand for subsequent cutting(s).

Prescribed Burning: Skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, and other conditions that will produce the intensity of heat and rate of spread required to accomplish certain planned benefits to one or more objectives of silviculture, wildlife management, grazing, and hazard reduction.

Presuppression: Activities in advance of fire occurrence to insure effective suppression action. Includes recruiting and training, planning the organization, maintaining fire equipment and fire control improvements, and procuring equipment and supplies (See Prevention; Suppression.)

Prevention: Activities directed at reducing the number of fires that start, including public education, law enforcement, personal contact, and reduction of fuel hazards.

Primitive: Undeveloped; in original state.

Pristine: Primitive; uncorrupted; unspoiled by man; natural state.

Progeny Test Area: An area, i.e., parcel of land, where the offspring of trees are studied for physical characteristics.

Pulpwood: Wood cut and prepared for manufacture into woodpulp.

Pure Stand: Area of trees predominantly of one species.

Put-To-Bed: Process of abandoning a road. Usually involves scarifying the road surface, water barring, seeding and possibly blocking the road.

Raptors: Birds of prey, i.e., hawks, eagles, vultures and owls.

Reach: Yarding distance capability.

Reconveyed: Return to former state; to convey back.

Recreation Areas (Sites): Developed campgrounds, picnic areas, etc., or areas that have potential for such development and have been administratively withdrawn for such future use.

Reforestation: Reestablishment of a tree crop on forest land.

Regeneration: The renewal of a tree crop, whether by natural or articicial means. Also, the young crop itself.

Reserved Timber: Trees reserved from cutting.

Revested: Reconveyed; returned to former owner.

Riparian Vegetation: The vegetation growing on or closely associated with the banks of streams, rivers, lakes or other water bodies.

Rip-Rap: A foundation or sustaining wall or bank of stones thrown together without order.

Salmonid Fish: Fish that are members of the Salmonidae family, i.e., trout, salmon, whitefish.

Sanitation/Salvage Cutting: Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

Sawlog: A log considered suitable in size and quality for producing sawn timber.

Sawtimber: Trees fit to yield sawlogs.

Scarification: Disturbance of the upper soil layer by mechanical means in preparing a site for seeding or planting.

Scenic Areas: Areas of outstanding scenic quality which are protected from adverse visual impact by administratively withdrawing them from timber production.

Scenic Corridors: Areas of land adjacent to main routes of travel, e.g., highways and watersays, which are protected for their scenic qualities (similar to buffer).

Schistose: Having the nature or structure of schist; foliated structure of rock and readily split into slabs or sheets.

Seedling: A young tree grown from the seed up to the sapling stage, that is a height of 4 1/2 to 6 feet.

Seral Stage: The relatively transitory communities within a sere.

Sere: The whole series of communities which develop in a given situation.

Setting: (1) A temporary station of a yarding or other machine used in logging; (2) The ground within the yarding reach or distance of a spar-tree.

Sheet Erosion: Erosion of a fairly homogenous layer of material; may be imperceptible, particularly when caused by wind.

Shelterwood Cutting: Any regeneration cutting in a more or less regular or mature crop designed to establish a new crop under the protection of the old.

Sidecast: Type of construction method whereby material cut from the slope face, to create a road subgrade, is allowed to spill over the outside edge of the cut.

Siliceous: Containing or like silica.

Silviculture: The art of producing and tending a forest.

Site: An area considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can carry.

Site Class: A measure of the relative productive capacity of an area for timber or other crops.

Skid Trail or Road: Any way, more or less prepared, over which logs are dragged.

Skidding: A loose term for hauling logs by sliding, not on wheels, as developed originally from stump to roadside.

Slash: The residue left on the ground after felling timber.

Snag: A standing dead tree from which the leaves and most of the branches have fallen.

Softwoods: A conventional term for both the timber and the trees belonging to the botanical group Gymnospermae. Usually have needle-shaped leaves.

Soil Creep: Slow downward movement of soil caused by water saturation.

Solifluxion: Soil creep; the slow, downhill flow of soil or soil layers saturated with water.

Spawning: Producing or depositing of eggs.

Spot Burning: A modified form of broadcast slash burning in which only the greater accumulations are fired and the fire is confined to these spots.

Spur Road: Usually, a relatively short, dead-end road from a main haul road.

Stem Rust: A disease of trees caused by fungi.

Stilling Basins: A pool incorporated in or below a spillway, essentially so as to dissipate the energy of the water pouring into it.

Streamside Corridors: A narrow strip either side of a stream which has been administratively reserved from timber management activities to protect the aquatic resources including fishery and fishery habitat. (Similar to buffer strip.)

Subgrade: The top surface of a roadbed upon which the traveled way and shoulders are constructed.

Suppression: All the work of extinguishing or confining a fire beginning with its discovery. (See Fire Control, Prevention, Presuppression.)

Surface Course: Top layer(s) of a surfacing structure consisting of finely crushed gravels or stone to provide a smooth running surface for traffic load.

Sustained Yield: The yield that a forest can produce continuously at a given intensity of management.

Sustained Yield Unit: An area that can produce continuously at a given intensity of management.

Symbiotic: Organisms together in intimate association, each organism usually either dependent upon or not harmful to the other.

Tectonic: Of, pertaining to, or designating structures resulting from deformation of the earth's crust.

Threatened Species: Plant or wildlife species that are likely to become endangered. (See Endangered.)

Timberline: The line above which there are no trees, i.e., on a mountain or in far north/south latitudes.

Tolerance: A term used to express the capacity of a tree to develop and grow in the shade of other trees. A tolerant tree grows well in the shade of other trees and an intolerant one does not.

Toxicant: A toxic agent; poison.

Transpiration: The loss of water vapor from plants into the atmosphere.

Tropic Level: An organims's food level or position in the producer-consumer structure of an ecosystem.

Tuffs: Accumulations of volcanic dust.

Turbid(ity): Sediment laden; clouded with mud; muddy.

Turn Of Logs: Logs brought to the landing in one trip.

Two-Storied: Having two distinct canopies. (See Canopy.)

Uneven-Aged Stand: A stand having at least three age classes intermingled intimately on the same area.

Visual Resource Management Classes: The degree of alteration that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogenous area.

Visual Resource: The land, water, vegetative, animal and other features that are visible on national resource lands.

Visual Zones: The area that can be seen as foreground, middleground, background or seldom seen.

Waterbar: A shallow channel, or raised barrier, laid diagonally across the surface of a road to lead water off the road.

Watershed: The area contained within a drainage divide which contributes flow to a specified point on a stream. The area drained by a river or stream.

Weed: Any unwanted plant, i.e., grass, brush or tree growth competing with commercial forest tree species.

Weir: A "dam" in a culvert or stream to raise the water level or divert its flow.

Wild and Scenic River: Any free-flowing stream designated and authorized for inclusion in the National Wild and Scenic Rivers System as provided by the Wild and Scenic Rivers Act of October 1968 (P. L. 90-542).

Wildfire: An unplanned fire requiring suppression action, as constrasted with a prescribed fire burning within prepared lines enclosing a designated area, under prescribed conditions. A free-burning fire unaffected by fire suppression measures.

Wilderness: An area of undeveloped land retaining its primeval character and influence without permanent improvements or human habitation.

Windthrown: Pushed over by wind, as a windthrown tree.

Woodland: Forest lands usually supporting open-grown, widely scattered trees of marginal merchantability, and generally more valuable for watershed or wildlife protection purposes than for the production of timber for commercial purposes. Of the total 92.5 million acres of woodland (1974 Public Land Statistics) managed by the Bureau, 21.3 million acres are scattered throughout the western contiguous states, excluding 71.3 million acres of woodland are located in Alaska.

Woody: Having woody parts; rich in xylem and associated structures.

Yarding: The operation of the initial haul to a collecting point, i.e., of transporting timber from stump to a yard or landing.

Xeric: Arid; dry.

APPENDIX A

BLM MANUAL 5424
(Preparation of Contract and Exhibits)

5424 - PREPARATION OF CONTRACT AND EXHIBITS

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5424 - PREPARATION OF CONTRACT AND EXHIBITS

.01 Purpose. The purpose of this Manual section is to provide standard instructions in the preparation of contract forms used for the sale of timber and other vegetative resources. This section prescribes contract file organization, preparation of contract forms and exhibits, insertion of special stipulations, and completion of Timber Sale Summary, Form 5420-2.

.02 Objectives. The objective is to establish uniform contract preparation by procedures and clearly written contracts which are understood by both the purchaser and the Authorized Officer.

.03 Authority. (See 5400.03.)

.04 Responsibility.

1. Director. The Director, through appropriate WO staff officials, is responsible for the establishment of stand contracting procedures and development of contract forms.

2. State Directors. The State Directors are responsible for compliance with standard Bureau contracting procedures and the development of special stipulations to achieve forest management and environmental protection goals within their areas of jurisdiction.

3. District Managers. District Managers are responsible for the accurate and timely preparation of timber sale contracts and periodic training of personnel responsible for timber sale contract preparation.

.05 Definitions. (Reserved)

.06 Policy. (Reserved)

5424 - PREPARATION OF CONTRACT AND EXHIBITS

.1 Contract File Organization. Arrange each file in an orderly manner. Include all documents and correspondence pertaining to the timber sale contract.

.11 Major Forest Products. File documents in a six-way, legal-size folder for each parcel of timber offered for sale.

A. File Arrangement.

1. Fasten to facing side of back cover:
    - a. Environmental analysis record
    - b. Precruise data
    - c. Cruise and appraisal data
2. Fasten to back side of second leaf:
    - a. Presale correspondence
    - b. Sale information
    - c. Contract preparation correspondence
    - d. Presale checklist
    - e. Type map
    - f. Logging Plan
    - g. Access map
    - h. Forest inventory depletion record
3. Fasten to facing side of second leaf all cutting reports and contract administration correspondence.
4. Fasten to back side of first leaf all copies of vouchers.
5. Fasten to front side of first leaf offical documents or original carbons of:
    - a. Contract and Exhibits
    - b. Modifications

c. Extensions

d. Assignments

e. Bond

.12 Minor Forest Products. File contract forms and backup material on each sale of minor forest products, such as fence posts, ferns, manzanita, etc., in chronological order in a standard legal-size manila folder. Retain files in the District Office for 3 years, then send them to the Federal Records Center. (See 1271, Appendix 1.)

5424 - PREPARATION OF CONTRACT AND EXHIBITS

.2 Advertised Sales. Prepare each timber sale contract to fulfill management plans and objectives.

.21 Lump Sum Sales. It is imperative that sufficient time is allowed for contract preparation to permit a thorough check of the contract, exhibits, and appraisal.

A. Contract Preparation.

Responsible Office/Official	Step	Action
District Manager	1.	Completes Form 5450-3, Contract for the Sale of Timber - Lump-Sum Sale. (See Illustration 1.) Deadline for contract preparation is as follows: - Two weeks before sales of less than 10 million feet. - Four weeks before sales of over 10 million feet but less than 25 million feet. - Six weeks before sales of over 25 million feet.
	2.	Summarizes timber sale location, acreage, type of sale, contract period, volume, value, and appraisal data on Form 5420-2, Timber Sale Summary. (See Illustration 6.)
	3.	Attaches Form 5420-2 to the contract folder.
	4.	Approves contract by surnaming. Orders advertisement and directs preparation of timber sale notice and prospectus when sale is less than 10 million board feet.
	5.	Sends proposed contracts for sales over 10 million board feet to the State Director.

Responsible Office/Official	Step	Action
State Director	6.	Approves contract by surnaming and returns contract to District Manager with instructions to proceed with sale when sale is less than 25 million board feet.
	7.	Sends proposed contracts for sales over 25 million board feet to Director (340).
Director (340)	8.	Reviews contract, makes corrections if necessary, and forwards to Director for approval.
		8a. If major revisions in sale layout or contract preparation are necessary, or further planning and analysis are needed, returns contract to the State Director.
	9.	After approval, returns contract to State Director.
State Director	10.	Returns contract to District Manager.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

B. Contract Provisions. The basic contract form which has been developed for the sale of timber (Form 5450-3, Contract for the Sale of Timber - Lump Sum Sale) provides for the inclusion of timber reservation stipulations and special provisions. Develop the wording of timber reserve clauses and special provisions prior to the advertising of the sale. Standard provisions are not altered. (See Appendices 3 and 4.)

1. Timber Sold. Section 1 of Form 5450-3 specifies that the Government sells to the purchaser and the purchaser buys from the Government all timber in the contract area except that which is reserved to the Government under Section 40.

2. Time for Cutting and Removal. The maximum permissible time for the cutting and removal of timber as set forth in the regulations governing the sale of forest products is thirty-six (36) months. A shorter period of time may be established for cutting and removing timber, depending on the circumstances of the particular sale. The length of time allowed the purchaser for cutting and removing timber depends upon the nature of the timber sale, the volume sold, and the effective operating season. Establish the time limits in advance of the sale and specify them in the timber sale advertising. All timber sold must be cut and removed within this period.

3. Time for Removal of Personal Property. The purchaser is allowed from 1 to 12 months additional time for the removal of personal property. Logs are not considered personal property within the context of BLM contracts.

4. Timber Reserved From Cutting. The importance of this provision can be well understood when it is realized that the purchaser may cut and remove any and all timber on the contract area which is not otherwise reserved to the Government. Insert the correct reservation stipulation into Section 40 of Form 5450-3 to adequately reserve timber from cutting and retain it as property of the Government. On the other hand, timber which has been sold and is intended to be cut should not be inadvertently reserved under Section 40 of Form 5450-3. (See Appendix 3.)

.21B5

5. Special Provisions. Include special provisions in Section 41 of Form 5450-3, or in Section 17 of Form 5450-1, Contract for the Cash Sale of Vegetative Resources. State Directors may develop special provisions when standard provisions are inadequate to cover the situation. (See Appendix 4.)

a. Prior Legal Review. Proposed special provisions developed by the State Director, other than those shown in Appendices 3 and 4, must be approved by the Regional or Field Solicitor before being included in a timber sale contract. Approval of special provisions may be on a case-by-case basis or for general usage.

b. Listings of Supplemental Provisions. The Director (340) publishes and maintains a list of approved timber reservation and special contract provisions.

c. Log Export Provisions. Timber sales west of the 100th meridian must contain special provisions restricting the export of timber from the United States. (See Appendices 1 and 2.)

6. Equal Opportunity in Employment. Attach Form 1140-3, Equal Opportunity in Employment - Certification of Nonsegregated Facilities, to contract. (See Illustration 8.)

5424 - PREPARATION OF CONTRACT AND EXHIBITS

C. Contract Exhibits. These include basic maps, erosion control diagrams, road construction plans and specifications, etc., needed to assure compliance with contract requirements. When preparing maps, use legend symbols and wording in the Map Symbol Handbook, BLM Manual 9161.

1. Contract Map. Section 1 of the basic series of timber sale contract forms requires that the contract area be shown on a map marked Exhibit A. This map shows contract areas, cutting areas, reserve areas, existing improvements, proposed improvements, topographic features, and found corners. The contract area coincides with legal subdivision boundaries wherever possible. (See Illustration 7.)

a. Distribution. Attach one copy to each copy of the contract. Additional copies should be printed for use later on with contract modifications, reforestation projects, slash burning plans, logging plans, etc.

b. Color. The standard color for reserve areas is green. Clear-cut areas are white. Zip-a-Tone or similar material and cross-hatching may be used to denote special yarding areas, partial cutting areas, previous sale areas, and other special cutting areas.

2. Exhibit B. Exhibit B sets forth, prior to sale advertising, the computations which will be applied to the contract unit prices to determine the value per acre of timber subject to cutting, or skidding or yarding, or removal. The timber values established by Exhibit B are usually on a value-per-acre basis.

3. Road Construction Plans and Specifications. If road construction or improvement is a part of a timber sale contract, attach maps and specifications marked Exhibit C, C-1, C-2, etc. These exhibits show road location, standards, surfacing, culvert quantities, clearing and culvert specifications, rock gradation, culvert gauge, plan, and profile.

4. Other Exhibits. Attach exhibits marked Exhibit D, E, etc., to the timber sale contract to insure timely and accurate completion of specific projects to be accomplished by the purchaser. Examples of projects which may require separate exhibits to the contract are:

a. Precommercial thinning stipulations.

b. Fence and/or cattleguard construction specifications.

c. Corner and/or bearing tree protection guidelines.

d. Planting or seeding instructions.

e. Slash disposal requirements.

f. Smoke management plan.

5. Miscellaneous Contract Documents. Other maps and data sheets may be included in the contract file for information or administrative purposes. These exhibits are not attached to the timber sale contract. (See .11.)

.22 Scale Sales. (Reserved)

.3 Cash Sale of Vegetative Resources. Sales of vegetative resources which are not measurable in board feet are made on Form 5450-1, Contract for the Cash Sale of Vegetative Resources. (See Illustration 3.) A bond should be required if damage to the resource or land may occur as a result of the purchaser's operations. The time for Extraction, Cutting, and Removal should be less than 12 months, but under no circumstances exceed 36 months. Special stipulations may be inserted on the back of the form or added as exhibits. (See .21B5a.)

.4 Nonadvertised Sales. Nonadvertised (negotiated) sales include new contracts or modification of existing contracts. The sale is made directly, without advertising or calling for bids. The Authorized Officer takes the following steps in preparing a nonadvertised sale:

- Determines that sale is in the interest of the United States.
- Writes memorandum to case file explaining why the sale is being made on a negotiated basis rather than under competitive bidding, a statement why no bond is required if such is the case, and a justification for the appraisal if it departs from a standard procedure.
- Prepares contract (see .2). If sale is a modification of an existing contract, prepares letter modification.

.41 Negotiated Sale of Vegetative Resources (Under $500). Sales under $500 may be made on Form 5450-5, Vegetative or Mineral Material Negotiated Cash Sale Contract ($500 and less). (See Illustration 4 for instructions for completing form. For reporting instructions, see Illustration 5.)

.5 Contract Numbering Procedure. A uniform system of contract numbering using an eleven-diget alphanumeric code was installed on July 1, 1969. This system is applicable to timber sale contracts executed on Form 5450-3, Contract for the Sale of Timber - Lump Sum Sale; Form 5430-4, Contract for the Sale of Timber - Scale Sale; and Form 5450-1, Contract for the Cash Sale of Vegetative Resources. (See Illustrations 1, 2, and 3.)

.51 Elements of Numbering System. Four elements make up the number:

A. Office Code. Use five digits to identify the office executing the document, followed by a hyphen. (See BLM Manual 1321 for office codes.)

B. Document Type. Use a two-letter alphabetic code to identify the type of transaction. Codes are:

TS - timber sale (Forms 5450-3 and 5430-4)

VG - vegetative resource sale (Form 5450-1)

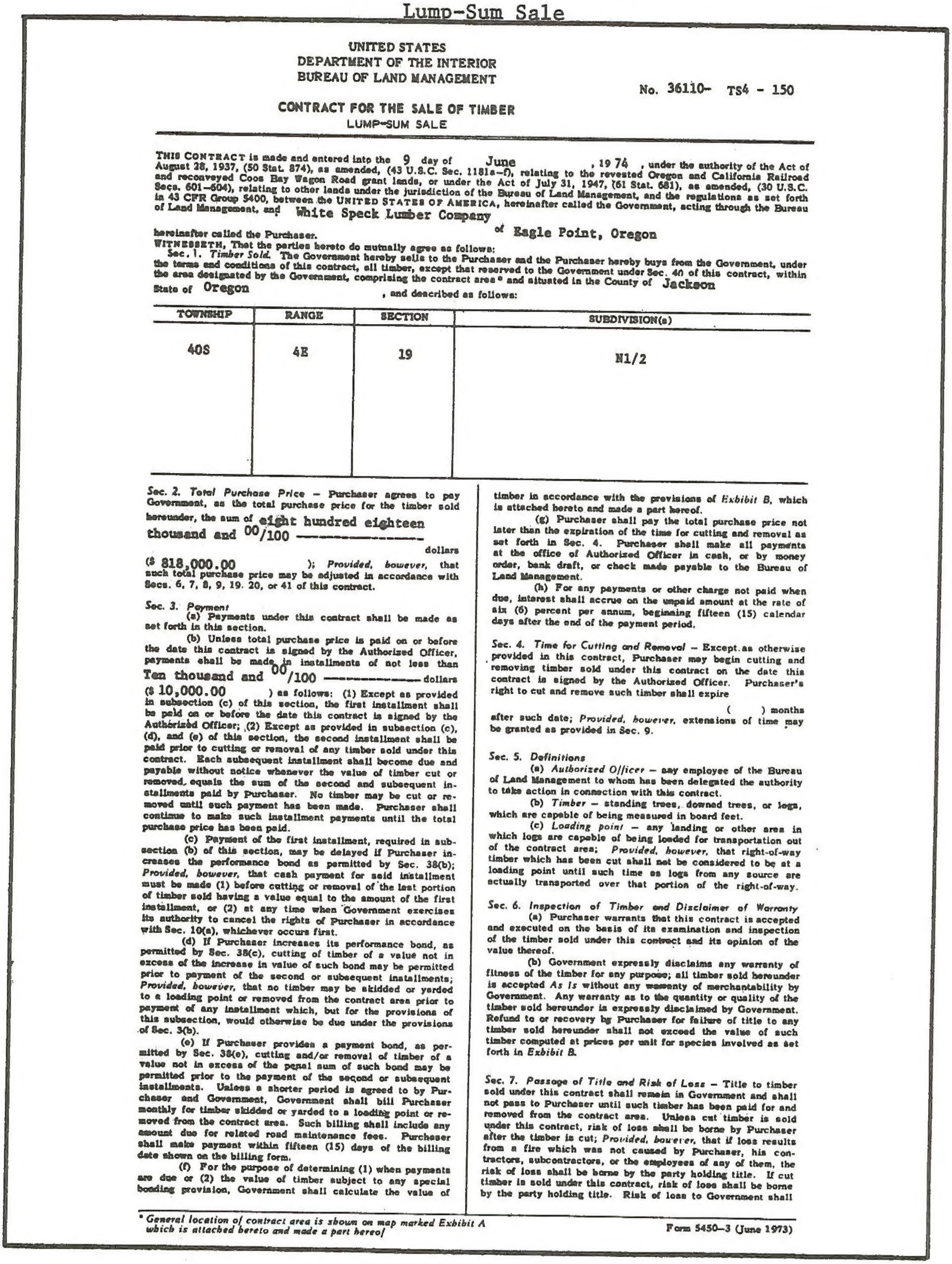
C. Fiscal Year Issued. Use one digit (the last digit of the year) followed by a hyphen.

D. Serial Number. Use up to four digits. Serial numbers revert to "1" each July 1. For example, a typical timber sale issued by the Boise District would be:

11010-TS1-101

.52 Filing. Documents are filed numerically according to serial number. A separate file and numbering system are maintained for each document type. A numerical index should be kept for each contract type, indicating the contractor's name and a brief description of the transaction.

Contract for the Sale of Timber
Lump-Sum Sale



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

No. 36110- TS4 - 150

CONTRACT FOR THE SALE OF TIMBER
LUMP-SUM SALE

THIS CONTRACT is made and entered into the 9 day of June, 19 74, under the authority of the Act of August 28, 1937, (50 Stat. 874), as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947, (61 Stat. 681), as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the **UNITED STATES OF AMERICA**, hereinafter called the Government, acting through the Bureau of Land Management, and White Speck Lumber Company of Eagle Point, Oregon hereinafter called the Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Timber Sold.* The Government hereby sells to the Purchaser and the Purchaser hereby buys from the Government, under the terms and conditions of this contract, all timber, except that reserved to the Government under Sec. 40 of this contract, within the area designated by the Government, comprising the contract area* and situated in the County of Jackson State of Oregon, and described as follows:

TOWNSHIP	RANGE	SECTION	SUBDIVISION(s)
40S	4E	19	N1/2

Sec. 2. Total Purchase Price – Purchaser agrees to pay Government, as the total purchase price for the timber sold hereunder, the sum of eight hundred eighteen thousand and 00/100 ——————— dollars ($ 818,000.00); *Provided, however,* that such total purchase price may be adjusted in accordance with Secs. 6, 7, 8, 9, 19. 20, or 41 of this contract.

Sec. 3. Payment

(a) Payments under this contract shall be made as set forth in this section.

(b) Unless total purchase price is paid on or before the date this contract is signed by the Authorized Officer, payments shall be made in installments of not less than Ten thousand and 00/100 ——————— dollars ($ 10,000.00) as follows: (1) Except as provided in subsection (c) of this section, the first installment shall be paid on or before the date this contract is signed by the Authorized Officer; (2) Except as provided in subsection (c), (d), and (e) of this section, the second installment shall be paid prior to cutting or removal of any timber sold under this contract. Each subsequent installment shall become due and payable without notice whenever the value of timber cut or removed, equals the sum of the second and subsequent installments paid by Purchaser. No timber may be cut or removed until such payment has been made. Purchaser shall continue to make such installment payments until the total purchase price has been paid.

(c) Payment of the first installment, required in subsection (b) of this section, may be delayed if Purchaser increases the performance bond as permitted by Sec. 38(b); *Provided, however,* that cash payment for said installment must be made (1) before cutting or removal of the last portion of timber sold having a value equal to the amount of the first installment, or (2) at any time when Government exercises its authority to cancel the rights of Purchaser in accordance with Sec. 10(a), whichever occurs first.

(d) If Purchaser increases its performance bond, as permitted by Sec. 38(c), cutting of timber of a value not in excess of the increase in value of such bond may be permitted prior to payment of the second or subsequent installments; *Provided, however,* that no timber may be skidded or yarded to a loading point or removed from the contract area prior to payment of any installment which, but for the provisions of this subsection, would otherwise be due under the provisions of Sec. 3(b).

(e) If Purchaser provides a payment bond, as permitted by Sec. 38(e), cutting and/or removal of timber of a value not in excess of the penal sum of such bond may be permitted prior to the payment of the second or subsequent installments. Unless a shorter period is agreed to by Purchaser and Government, Government shall bill Purchaser monthly for timber skidded or yarded to a loading point or removed from the contract area. Such billing shall include any amount due for related road maintenance fees. Purchaser shall make payment within fifteen (15) days of the billing date shown on the billing form.

(f) For the purpose of determining (1) when payments are due or (2) the value of timber subject to any special bonding provision, Government shall calculate the value of timber in accordance with the provisions of *Exhibit B*, which is attached hereto and made a part hereof.

(g) Purchaser shall pay the total purchase price not later than the expiration of the time for cutting and removal as set forth in Sec. 4. Purchaser shall make all payments at the office of Authorized Officer in cash, or by money order, bank draft, or check made payable to the Bureau of Land Management.

(h) For any payments or other charge not paid when due, interest shall accrue on the unpaid amount at the rate of six (6) percent per annum, beginning fifteen (15) calendar days after the end of the payment period.

Sec. 4. Time for Cutting and Removal – Except as otherwise provided in this contract, Purchaser may begin cutting and removing timber sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut and remove such timber shall expire ( ) months after such date; *Provided, however,* extensions of time may be granted as provided in Sec. 9.

Sec. 5. Definitions

(a) *Authorized Officer* – any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) *Timber* – standing trees, downed trees, or logs, which are capable of being measured in board feet.

(c) *Loading point* – any landing or other area in which logs are capable of being loaded for transportation out of the contract area; *Provided, however,* that right-of-way timber which has been cut shall not be considered to be at a loading point until such time as logs from any source are actually transported over that portion of the right-of-way.

Sec. 6. Inspection of Timber and Disclaimer of Warranty

(a) Purchaser warrants that this contract is accepted and executed on the basis of its examination and inspection of the timber sold under this contract and its opinion of the value thereof.

(b) Government expressly disclaims any warranty of fitness of the timber for any purpose; all timber sold hereunder is accepted *As Is* without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the timber sold hereunder is expressly disclaimed by Government. Refund to or recovery by Purchaser for failure of title to any timber sold hereunder shall not exceed the value of such timber computed at prices per unit for species involved as set forth in *Exhibit B*.

Sec. 7. Passage of Title and Risk of Loss – Title to timber sold under this contract shall remain in Government and shall not pass to Purchaser until such timber has been paid for and removed from the contract area. Unless cut timber is sold under this contract, risk of loss shall be borne by Purchaser after the timber is cut; *Provided, however,* that if loss results from a fire which was not caused by Purchaser, his contractors, subcontractors, or the employees of any of them, the risk of loss shall be borne by the party holding title. If cut timber is sold under this contract, risk of loss shall be borne by the party holding title. Risk of loss to Government shall

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* *General location of contract area is shown on map marked Exhibit A which is attached hereto and made a part hereof*

Form 5450–3 (June 1973)

Contract for the Sale of Timber
Lump-Sum Sale

not exceed the value of such timber computed at the prices per unit for the species involved as set forth in *Exhibit B*. Nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act. As used in this section, the term *cut timber* refers only to timber which has been felled, bucked, or otherwise severed by direct human activity prior to the date this contract was entered into.

Sec. 8. *Sales of Additional Timber* – If the Authorized Officer and Purchaser agree that additional timber should be removed and the Authorized Officer determines that the sale will not be detrimental to the interests of Government and is within the provisions of 43 CFR 5402.0–6, the Authorized Officer shall grant written permission to Purchaser to cut and remove such timber. If permission is granted, Purchaser shall pay for such timber at a price determined by the Authorized Officer in accordance with the Bureau of Land Management prescribed procedures. The value and volume of such timber shall be added to *Exhibit B* and the value thereof shall be added to total purchase price in Sec. 2. Payment for such timber shall be made in accordance with Sec. 3(b) or 3(e), except that, if all contract payments required by Sec. 3(b) or 3(e) have been made, payment for such timber shall be made in advance as a condition of granting such permission.

Sec. 9. *Extension of Time and Reappraisal* – If Purchaser shows that delay in cutting and removal was due to causes beyond his control and without his fault or negligence, the Authorized Officer may grant an extension of time, not to exceed one year, upon written request of Purchaser. Such written request shall be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in Sec. 4. If an extension of time is granted, as provided in this section, timber remaining on contract area shall be reappraised by the Authorized Officer, using Bureau of Land Management prescribed procedures, and the total purchase price adjusted accordingly; *Provided, however,* no adjustment shall be made by reason of timber being enhanced in value by Purchaser, nor shall the reappraised total purchase price be less than the total purchase price in effect during the original time for cutting and removal or the last extension. The Authorized Officer may require that the reappraised total purchase price shall be paid in advance as a condition of granting an extension. Market fluctuations shall not be cause for consideration of contract extensions.

Sec. 10. *Violations, Suspension, and Cancellation*

(a) If Purchaser violates any provision of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, except such operations as may be necessary to remedy the violation. If Purchaser fails to remedy the violation within thirty (30) days after receipt of a suspension notice, the Authorized Officer may, by written notice, cancel the rights of the Purchaser under this contract and take appropriate action to recover all damages suffered by Government by reason of such violation, including application toward payment of such damages of any advance payments and any performance bonds or, where applicable, any payment bonds; *Provided, however,* that if the violation involves nonpayment of amounts due for timber cut and/or removed under a payment bond of a corporate surety, the Authorized Officer must, in addition to the above requirements, allow sixty (60) days after making demand upon surety for any payment due before cancelling the rights of Purchaser.

(b) If Purchaser cuts or removes any timber sold under this contract during any period of suspension, such cutting or removal shall be considered a wilful trespass and render Purchaser liable for damages under applicable law. Any payment made for purchase price of timber cut or removed in trespass shall be deducted to the extent of single damages or the value of timber under this contract, whichever is lesser, from amount due because of trespass.

(c) If Purchaser's operations are suspended because of Purchaser's failure to make an installment payment when due, the Authorized Officer may require Purchaser to pay the entire remaining balance of the purchase price as a condition of terminating the suspension.

(d) If Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber reserved under this contract, they shall fully cooperate, upon request of the Authorized Officer, in the investigation of such acts. If in the opinion of the Authorized Officer, full cooperation is not received or will not be forthcoming, he may suspend that portion of Purchaser's operations necessary to preserve evidence pending investigation or permit safe investigation of such acts.

Sec. 11. *Credit Against Purchase Price* – If the time specified for cutting and removal of timber has expired or the rights of Purchaser have been cancelled, Purchaser shall be entitled to a credit against any amount which is due and owing Government for timber remaining on the contract area. The Authorized Officer shall determine the credit value of the remaining timber as soon as possible after the date of expiration or cancellation. Credit value of the remaining timber shall be total market value, as established by the Authorized Officer by reappraisal or resale, or total value based upon contract unit prices, whichever is less. There shall be deducted from credit value such amounts as the Authorized Officer determines adequate to cover costs to Government resulting from Purchaser's failure to perform, including but not limited to costs of appraising and administering any resale of timber.

Sec. 12. *Responsibility for Damage Suffered, Cost, or Expense Incurred by Government* – Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 13. *Timber Trespass* – If in connection with operations hereunder Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber, other than timber sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 14. *Protection of Utilities and Improvements* – Existing telephone, telegraph and transmission lines, fences, ditches, roads, trails, and other improvements shall be protected as far as practicable in all phases of Purchaser's construction or logging operations. All roads and trails, designated by the Authorized Officer as needed for fire protection or other purposes, shall be kept free of logs, slash, and debris. Damage to utilities and improvements shall be promptly paid for or repaired to a condition which, in the opinion of the Authorized Officer, is at least as good as the condition just prior to such damage.

Sec. 15. *Fire Prevention and Slash Disposal* – Purchaser shall take such measures for prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations as are required by applicable laws and regulations. *However,* when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 16. *Construction, Use and Maintenance of Roads and Facilities*

(a) Subject to the written approval of and regulation by the Authorized Officer, Purchaser may: (1) construct and use any new roads and facilities not otherwise provided for in this contract, and (2) use any existing roads and facilities not otherwise provided for in this contract.

(b) Except as provided in Sec. 12, Purchaser shall perform or pay for repair and maintenance of any road or facility used under the terms of this contract in accordance with the requirements of Sec. 41; *Provided, however,* that Purchaser shall not be responsible for maintenance or repair of wear or damage caused by third parties, or maintenance or repair which exceeds the standards of required maintenance shown in Sec. 41; and *Provided, further,* that Purchaser's responsibility under this provision shall not commence prior to the date on which he first begins operations and shall cease upon completion and written acceptance of all contract requirements other than slash disposal, except for maintenance and repair of damages resulting from Purchaser's slash disposal activities.

Sec. 17. *Limitations of Road Use*

(a) Purchaser's right under this contract to use existing Government roads described herein, or roads to be constructed, is limited to removal of timber sold under this contract; *Provided, however,* that this provision shall not limit any right to use Government roads or rights-of-way which have been granted to Purchaser pursuant to 43 CFR Group 2800.

(b) For the purpose of protecting roads described herein, Purchaser shall immediately discontinue use of said roads upon receipt of written notice that the Authorized Officer has determined that continued use will cause excessive damage to said roads.

Sec. 18. *Acceptance of Road Construction*

(a) Whenever Purchaser shall deliver to the Authorized Officer a written statement that the road construction is complete, pursuant to the contract terms, the Authorized Officer shall promptly inspect such road. If the contract road construction requirements have been completed to the satisfaction of the Authorized Officer, Purchaser will be given written notice of acceptance, and, except as provided in Sec. 12, be released from further liability or duty for construction or reconstruction of such road.

(b) Notwithstanding acceptance of any road under this section, Purchaser shall remain liable for maintenance and repair of any such road in accordance with the provisions of Sec. 16.

Sec. 19. *Cost Adjustment for Physical Changes* – If, prior to acceptance of a road under Sec. 18, a major physical change, caused by a single event, and not due to negligence of Purchaser, his contractors, subcontractors, or the employees

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Lump-Sum Sale

of any of them, results in additional work by Purchaser involving an additional estimated cost of more than (1) $1,000 for sales under one million board feet; (2) $1.00 per thousand board feet for sale of one to three million board feet; or (3) $3,000 for sales over three million board feet, Government shall become responsible for any estimated cost which exceeds the above amounts. Government may elect to meet its share by reducing the purchase price or by payment of such cost to Purchaser or by performing its share of the necessary work. The estimated cost of additional work shall be calculated by the Authorized Officer using Bureau of Land Management prescribed appraisal procedures. Such cost shall include the cumulative estimated costs of repairing damage from slides, washouts, landslips, fire, etc. caused by said event. If necessary, plans and specifications shall be revised to meet the new conditions. Purchaser must obtain advance approval from the Authorized Officer for such additional work in order for Purchaser to be eligible for cost adjustment under this section.

Sec. 20. Design Change – If Purchaser and the Authorized Officer agree on a design change of a substantial nature in any road, road structure, or bridge required to be constructed or improved under the terms of this contract, the total purchase price shall be revised to reflect the estimated increase or decrease in cost resulting from such design change. A design change of substantial nature is one that would result in a cost adjustment of $1,000 or more.

Sec. 21. Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser – If any of Purchaser's obligations remain unperformed after expiration of the time for removal of personal property, as set forth in Sec. 39, or if the rights of Purchaser under this contract have been cancelled by Government, all provisions of this contract for the benefit and protection of Government or third parties shall remain in effect until this contract is terminated in its entirety by Government.

Sec. 22. Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees – Purchaser shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the contract area. If any monuments, corners, or accessories are destroyed, obliterated, or damaged by such operations, Purchaser shall hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories, at the same location, using surveying procedures in accordance with the *Manual of Instructions for the Survey of the Public Lands of the United States*, and shall record such survey in appropriate county records. The Authorized Officer may prescribe in writing additional requirements for protection of monuments, corners, and bearing trees.

Sec. 23. Purchaser's Representative – At all times when construction or logging operations are in progress, Purchaser shall have a representative readily available in the area of such operations who shall be authorized to receive, in behalf of Purchaser, any notices or instructions from the Authorized Officer in regard to performance under this contract. Purchaser shall take such action as is required by the terms of this contract.

Sec. 24. Simultaneous Use of Contract Area by Others – If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 25. Watershed Protection: Water Quality, Erosion Control and Soil Damage

(a) Purchaser shall comply with all applicable State and Federal laws and regulations pertaining to water quality in connection with any operations under this contract.

(b) Purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If Purchaser's operations cause pollution or obstruction of any stream, lake, or reservoir on or near the contract area, Purchaser shall correct the condition to the satisfaction of the Authorized Officer.

(c) Purchaser shall undertake every reasonable measure to minimize erosion and soil damage in connection with any operations under this contract, including but not limited to construction of water bars on yarding and spur roads as designated by the Authorized Officer. Purchaser shall immediately discontinue any construction or timber harvesting operations under this contract, upon receipt of written notice from the Authorized Officer that due to weather or soil moisture conditions, such operations will cause excessive damage to the soil. The Authorized Officer shall notify Purchaser, in writing, when such operations may be resumed.

Sec. 26. Refuse Control and Disposition of Waste Materials

(a) Purchaser shall, to the satisfaction of the Authorized Officer, remove, or otherwise dispose of all garbage, temporary buildings, trash, litter, discarded equipment or parts, waste materials or other refuse resulting from Purchaser's operations. Areas for disposal of waste material shall be subject to approval of the Authorized Officer.

(b) Waste materials, such as garbage, trash, oil, grease, chemicals and similar substances shall be disposed of in a manner that will prevent their entry by drainage, high water, or other means into any river, watercourse, lake, or reservoir in or near Purchaser's operations. Water used to wash down equipment used for petroleum products, industrial chemicals, cement or other toxic materials shall be disposed of in a manner that will prevent their entry into any watercourse or waterway.

Sec. 27. Storage and Handling of Hazardous Materials – All petroleum products, industrial chemicals and similar toxic or volatile materials stored by Purchaser on or near the contract area, in connection with operations under this contract, shall be stored in durable containers and shall be stored in areas, as determined by the Authorized Officer, which are either located so that any accidental spillage will not drain into any watercourses, lakes, or reservoirs or, when such areas are not available, shall be stored in an area surrounded by impermeable containment dikes of sufficient capacity to contain the aggregate capacity of all tanks.

In addition, Purchaser shall comply with all applicable State and Federal laws and regulations concerning the storage, handling, use and disposal of industrial chemicals, pesticides, herbicides, and other hazardous substances.

Sec. 28. Safety and Health – Purchaser shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health and sanitation laws, codes, and regulations and shall make it possible for the Authorized Officer to inspect such operations.

Sec. 29. Equal Opportunity – During the performance of this contract, Purchaser agrees as follows:

(a) Purchaser will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this section.

(b) Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of Purchaser's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Purchaser's noncompliance with this section, contract may be cancelled, terminated or suspended in whole or in part and Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) Purchaser will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor, or vendor. Purchaser will take such action with respect to any subcontract, or purchase order, as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however*, that in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor, or vendor as a result of such direction by the contracting agency, Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 30. Records and Reports – Upon request of the Authorized Officer, Purchaser shall furnish the following records and reports: (1) volume or quantity of timber cut and removed from the contract area; (2) road costs including road use fees paid in connection with removing timber from the contract area; and (3) prices received for lumber or other wood products.

Sec. 31. Unsatisfactory Bond – Whenever any performance or payment bond furnished under this contract becomes unsatisfactory to the Authorized Officer, he may require a new bond which is satisfactory to him.

Sec. 32. Assignments

(a) Purchaser may not assign this contract or any interest therein without written approval of the Authorized Officer. An assignment shall contain all the terms and conditions agreed upon by the parties thereto.

(b) The Authorized Officer will not approve any assignment involving contract performance unless assignee: (1) is authorized to transact business in the State indicated in Sec. 1; (2) submits such information as is necessary to assure the Authorized Officer of his ability to fulfill the contract; and (3) furnishes a performance bond as required by Sec. 38 or obtains a commitment from the previous surety to be bound by the assignment when approved. Upon approval of an assignment by the Authorized Officer, the assignee shall be entitled to all the rights and subject to all the obligations of this contract and the assignor shall be released from any further liability under this contract.

Contract for the Sale of Timber
Lump-Sum Sale

Sec. 33. Contingent Fees – Purchaser warrants that no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial agencies maintained by Purchaser for the purpose of securing business. For breach or violation of this warranty, Government shall have the right to cancel this contract without liability or, in its discretion, to require Purchaser to pay, in addition to the contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

Sec. 34. Successors in Interest – Every obligation hereunder shall extend to and be binding upon the successors in interest of the parties hereto and every benefit hereunder shall inure to such successors.

Sec. 35. Exercise of Rights or Duties of the Authorized Officer – The rights or duties of the Authorized Officer may be exercised by the Authorized Officer or his designated representative.

Sec. 36. Officials not to Benefit – No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4, shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom; and the provisions of Section 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Sections 431, 432, and 433, Title 18, U.S.C., relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 37. Appeal – An appeal may be taken from any decision of any officer of the Bureau of Land Management to the Board of Land Appeals pursuant to the Rules of Practice (43 CFR Part 4 Subpart E).

Sec. 38. Bond

(a) A performance bond shall be filed by Purchaser on or before the date this contract is signed by the Authorized Officer in the amount of One hundred sixty three thousand, six hundred & 00/100 dollars ($163,600.00).

(b) If Purchaser elects to increase the amount of the performance bond required above by an amount equal to the first installment, in order to secure the delayed payment of said installment, as provided in Sec. 3(c), increased bond shall be on a form approved by the Director of the Bureau of Land Management which upon completion must be approved, in writing, by the Authorized Officer. If a corporate surety bond is used, the bond shall provide that the Surety will pay to Government the amount of the increase within sixty (60) days after demand by Government whenever the Principal shall fail to make payment as required in Sec. 3(c).

(c) If Purchaser elects to cut timber before payment of the second or subsequent installments, Purchaser shall increase the amount of the required performance bond by an amount equal to one or more installments, as set forth in Sec. 3(b). The adjusted bond must be approved, in writing, by the Authorized Officer prior to cutting any timber under the adjusted bond. The increased amount of bond shall be used to assure payment for such timber. Timber cut pursuant to this subsection may be paid for in installments. Upon payments, the increased amount of bond may be applied to other timber sold under this contract to permit its cutting in advance of payment.

(d) As contract provisions are completed to the satisfaction of the Authorized Officer, he may, in his discretion, reduce amount of performance bond required; *Provided, however,* the performance bond may not be reduced below the amount of One hundred sixty three thousand, six hundred and 00/100––dollars ($163,600.00 until total purchase price has been paid. The performance bond shall be forfeited to the amount of damages, determined by the Authorized Officer if all contract provisions are not faithfully and fully performed by Purchaser. If the amount of damages exceeds the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled or, if cash or negotiable securities are furnished in lieu of a performance bond, such cash or negotiable securities shall be returned to Purchaser. In event of litigation, any determination by the Authorized Officer as to the amount of damages will be subject to review by a court of competent jurisdiction.

(e) If Purchaser elects to: (1) cut and remove timber or (2) remove timber already cut which has been secured by an increased performance bond as provided in Sec. 38(c), before payment of the second or subsequent installments, Purchaser shall obtain a payment bond in an amount equal to one or more installments as set forth in Sec. 3(b). The payment bond must be approved, in writing, by the Authorized Officer prior to cutting or removing any timber under the bond. The amount of the bond shall be used to assure payment for such timber, *Provided, however,* that such bond shall be considered as payment under Sec. 7, for the purpose of passing title and risk of loss to timber sold. Timber cut pursuant to this subsection shall be paid for as provided in Sec. 3(e). Upon payment, the amount of the bond may be applied to other timber to permit its cutting and/or removal in advance of payment. If a bond of a corporate surety is used, it shall provide that, if Purchaser fails to make payment as required by Sec. 3(e), the surety will make such payment including interest as specified in Sec. 3(h), to Government within sixty (60) days after demand by Government.

Sec. 39. Time for Removal of Personal Property – Purchaser shall have the right within two (2) months after expiration of time for cutting and removal to remove his equipment, improvements, or other personal property from Government lands or rights-of-way; *Provided, however,* that any improvements such as road surfacing, culverts and bridges which have become a permanent part of a Government road, shall not be removed. The Authorized Officer may, in his discretion, grant an extension of time, not to exceed three (3) months for removal of personal property. Any equipment, improvements, or other personal property remaining on Government lands and rights-of-way at the end of the period for removal, or any extension, shall become the property of Government.

Sec. 40. Timber Reserved from Cutting – The following timber on the contract area is hereby reserved from cutting and removal under the terms of this contract and is retained as the property of Government.

(See Appendix 3 for Timber Reservation Provisions)

Sec. 41. Special Provisions – Purchaser shall comply with the special provisions which are attached hereto and made a part hereof unless otherwise authorized, in writing, by the Authorized Officer. (See Appendix 4 for Special Provisions)

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day first above written.

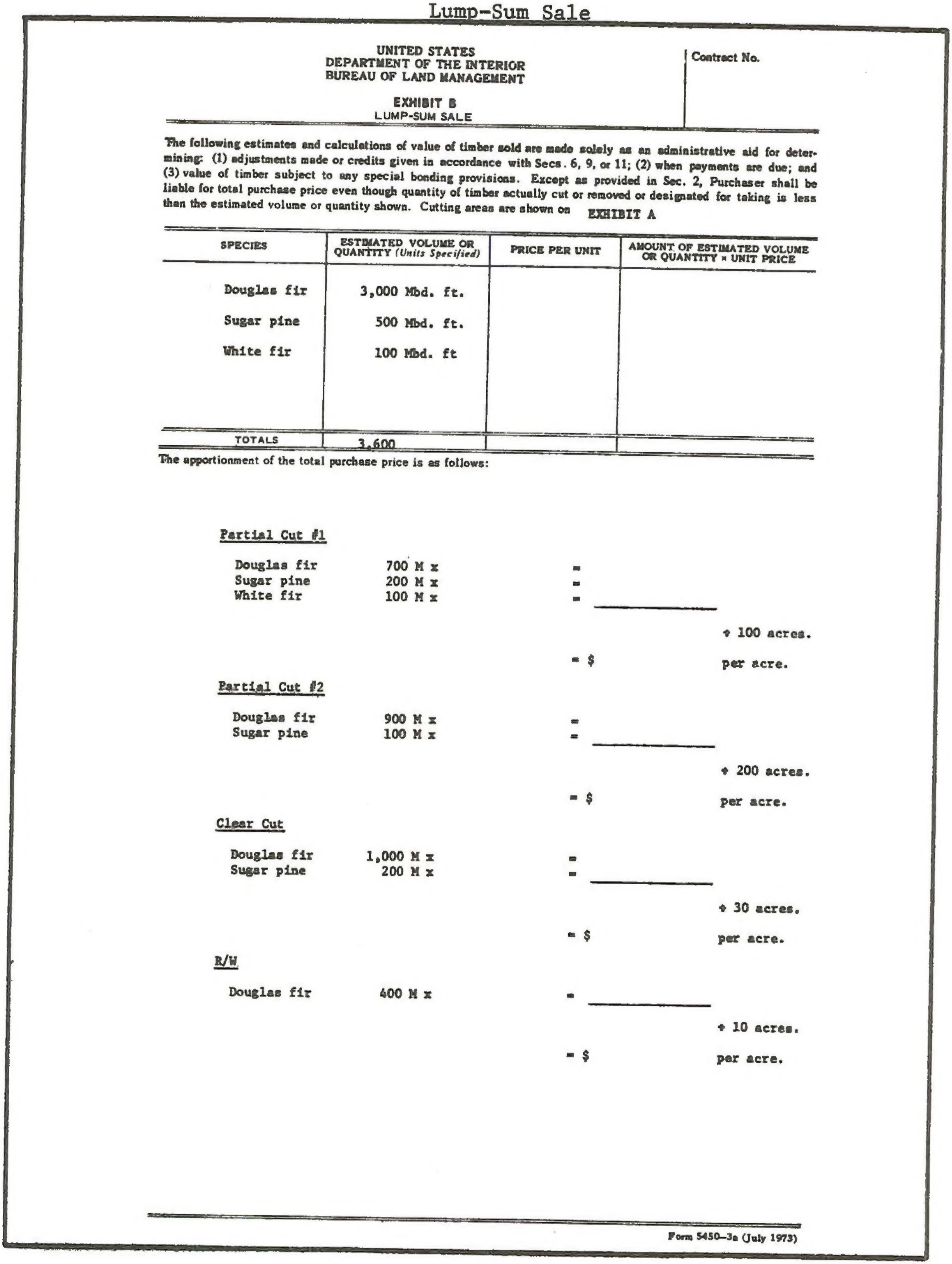
If Individual or Partnership, sign here:	If Corporation, sign here:
(Name of Firm)	White Speck Lumber Company (Name of Corporation)
(Name)	Ike Cutter (Name)
(Address)	President (Title)
(Name)	UNITED STATES OF AMERICA By Don Stilles (Name)
(Address)	District Manager (Title)
(Name)	June 29, 1974 (Date)
(Address)	

(If Purchaser is a corporation, the following certificate must be executed by the Secretary or Assistant Secretary of the Corporation)

I, La Joan Forty, certify that I am the Secretary of the corporation named as Purchaser herein; that Ike Cutter, who signed the contract was then President of said corporation, that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

La Joan Forty [CORPORATE SEAL]

Exhibit B
Lump-Sum Sale



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EXHIBIT B
LUMP-SUM SALE

Contract No.

The following estimates and calculations of value of timber sold are made solely as an administrative aid for determining: (1) adjustments made or credits given in accordance with Secs. 6, 9, or 11; (2) when payments are due; and (3) value of timber subject to any special bonding provisions. Except as provided in Sec. 2, Purchaser shall be liable for total purchase price even though quantity of timber actually cut or removed or designated for taking is less than the estimated volume or quantity shown. Cutting areas are shown on EXHIBIT A

SPECIES	ESTIMATED VOLUME OR QUANTITY *(Units Specified)*	PRICE PER UNIT	AMOUNT OF ESTIMATED VOLUME OR QUANTITY × UNIT PRICE
Douglas fir	3,000 Mbd. ft.		
Sugar pine	500 Mbd. ft.		
White fir	100 Mbd. ft		
TOTALS	3,600		

The apportionment of the total purchase price is as follows:

Partial Cut #1

Douglas fir 700 M x =
Sugar pine 200 M x =
White fir 100 M x = ____________

÷ 100 acres.

= $ per acre.

Partial Cut #2

Douglas fir 900 M x =
Sugar pine 100 M x = ____________

÷ 200 acres.

= $ per acre.

Clear Cut

Douglas fir 1,000 M x =
Sugar pine 200 M x = ____________

÷ 30 acres.

= $ per acre.

R/W

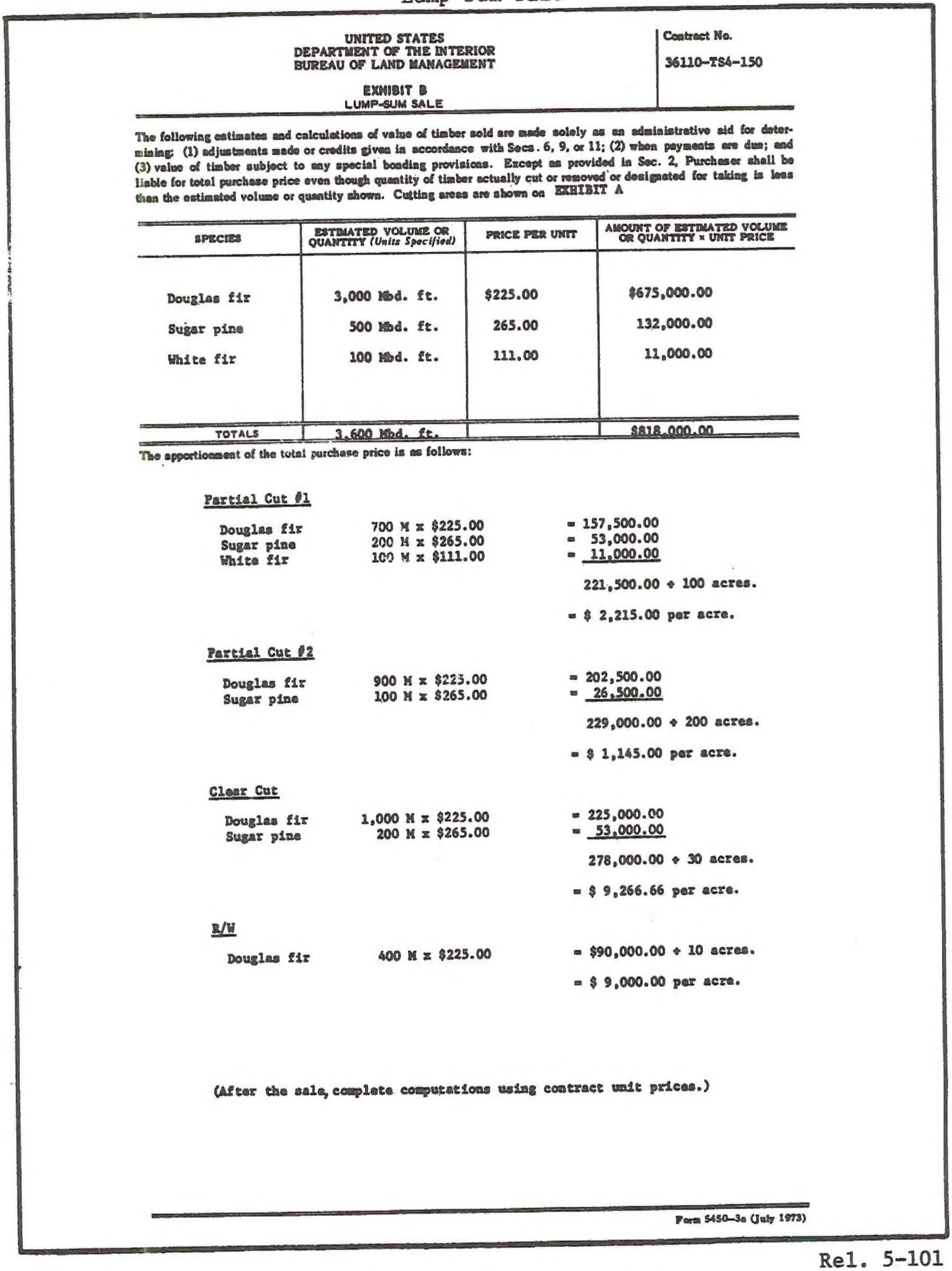
Douglas fir 400 M x = ____________

÷ 10 acres.

= $ per acre.

Form 5450-3a (July 1973)

Exhibit B
Lump-Sum Sale



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EXHIBIT B
LUMP-SUM SALE

Contract No.
36110-TS4-150

The following estimates and calculations of value of timber sold are made solely as an administrative aid for determining: (1) adjustments made or credits given in accordance with Secs. 6, 9, or 11; (2) when payments are due; and (3) value of timber subject to any special bonding provisions. Except as provided in Sec. 2, Purchaser shall be liable for total purchase price even though quantity of timber actually cut or removed or designated for taking is less than the estimated volume or quantity shown. Cutting areas are shown on EXHIBIT A

SPECIES	ESTIMATED VOLUME OR QUANTITY *(Units Specified)*	PRICE PER UNIT	AMOUNT OF ESTIMATED VOLUME OR QUANTITY × UNIT PRICE
Douglas fir	3,000 Mbd. ft.	$225.00	$675,000.00
Sugar pine	500 Mbd. ft.	265.00	132,000.00
White fir	100 Mbd. ft.	111.00	11,000.00
TOTALS	3,600 Mbd. ft.		$818,000.00

The apportionment of the total purchase price is as follows:

Partial Cut #1

Douglas fir	700 M x $225.00	= 157,500.00
Sugar pine	200 M x $265.00	= 53,000.00
White fir	100 M x $111.00	= 11,000.00

221,500.00 ÷ 100 acres.

= $ 2,215.00 per acre.

Partial Cut #2

Douglas fir	900 M x $225.00	= 202,500.00
Sugar pine	100 M x $265.00	= 26,500.00

229,000.00 ÷ 200 acres.

= $ 1,145.00 per acre.

Clear Cut

Douglas fir	1,000 M x $225.00	= 225,000.00
Sugar pine	200 M x $265.00	= 53,000.00

278,000.00 ÷ 30 acres.

= $ 9,266.66 per acre.

R/W

Douglas fir	400 M x $225.00	= $90,000.00 ÷ 10 acres.

= $ 9,000.00 per acre.

(After the sale, complete computations using contract unit prices.)

Form 5450-3a (July 1973)

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Explanation of Contract

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Preamble

The preamble is the opening statement of the contract. It serves to establish the parties to the contract, the date the contract is made and entered into, and the laws and regulations which authorize the action. It sets the stage for agreement to the conditions of the contract.

In the preamble the parties to the contract are identified. The first party of the contract is the United States of America, acting through the Bureau of Land Management. For brevity, this party is identified throughout the contract as the "Government."

The second party to the contract is the purchaser. The contract form provides a space for entry of the name and address of the purchaser. It is important to properly identify the purchaser. In the case of a corporation, the name should appear in the contract in the exact manner of use as established by the company. If more than one individual is the purchaser, each name must appear in the space provided. Assumed business names may be shown but it is most important that all individuals are included. If the purchaser is a partnership, the names of all parties must be listed as well as the name of the firm under which they are doing business. The address of the purchaser is entered following the name of the purchaser.

The date the contract is made and entered into has its own special significance. This date is the specific date upon which an offer made by the purchaser is accepted by the Government. The purchaser makes his formal offer on the date of the sale. The Government formally accepts the bid when the Authorized Officer so notifies the bidder of such acceptance in writing. It is incorrect to use the sale date as the date of the contract unless the formal acceptance letter is mailed to the purchaser on the sale date.

The date the contract is made and entered into is to be distinguished from the approval date of the contract. The approval date is the date upon which the Authorized Officer signs the contract on behalf of the Government. The approval date is important because time elements of the contract are measured from the approval date.

The date the contract is made and entered into is important to the purchaser. It establishes the date of purchase from which time is calculated for capital gains purposes within the Internal Revenue Code. Use of an improper date may cause a disservice to the purchaser and create additional tax burdens for the purchaser.

For negotiated sales the date the contract is made and entered into is the date the purchaser signs the contract if the signing takes place in the District Office. In the event the contract is transmitted to the purchaser for signature, the date of the contract must coincide with the date of the transmittal letter.

Section 1: Timber Sold

Section 1 of the contract establishes that the Government sells and the purchaser buys certain timber subject to the terms and conditions of the contract. Section 1 requires that the location of the timber be described in the body of the contract by legal description (township, range, section, and subdivision), including identification of county and State. Lands thus described comprise the contract area. Standard procedure for listing legal descriptions is to list township and range in ascending numerical order, followed by section and subdivisions of sections. List quarter section and 40-acre subdivisions in counterclockwise order commending with the NE 1/4 NE 1/4. List lot by lot number only. Examples are as follows:

T15S, R7W, Sec. 24, NE1/4NE1/4, SW1/4NE1/4, NW1/4, NE1/4SW1/4
S1/2SE1/4

T15S, R8W, Sec. 31, Lot 1, Lot 2
Sec. 32, NE1/4, E1/2NW1/4

Section 1 of the contract also specifies that the general location of the contract area be shown on a map which is identified as Exhibit A. The Exhibit A is attached to and becomes a part of the contract. Every contract must have a map showing the contract area.

The contract map generally consists of a topographic map (usually at a scale of 1 inch to 1,000 feet) showing the lands, improvements, and cutting areas comprising the contract area. It is important that the map be a reasonably accurate representative of the ground conditions and adequately portrays the contract terms. The boundaries of the contract area must be shown on the map. (See Illustration 7.)

Section 2: Total Purchase Price

Section 2 of the contract establishes the total purchase price which the purchaser agrees to pay the Government for the timber sold pursuant to the terms and conditions of the contract. The total purchase price is the amount bid by the purchaser. It is expressed in the contract in both words and figures in the space provided in Section 2. The purchase price must agree with information on Form 5440-9, as illustrated in BLM Manual 5441, Deposit and Bid for Timber, which is written confirmation of the purchaser's bid.

The total purchase price may be adjusted in accordance with certain sections of the contract. The discussion under the appropriate sections should be reviewed, in addition to the following:

Under Section 6, Inspection of Timber and Disclaimer of Warranty, part (b), adjustments would be downward if there is a failure of title to any of the timber sold.

Under Section 7, Passage of Title and Risk of Loss, adjustments would be downward in the event of timber losses, particularly damage to timber for which the Government bears the risk of loss.

Under Section 8, Sales of Additional Timber, adjustments would be upward following sales of additional timber to the contract.

Under Section 9, Extension of Time and Reappraisal, adjustments would be upward in the event of increase in value of the remaining timber following reappraisal for contract extension.

Under Section 19, Cost Adjustment for Physical Changes, adjustments would be downward in use of this option as a method for Government to share the purchaser's cost of repairing major damage which occur to require road construction prior to acceptance of the completed construction.

Under Section 20, Design Change, adjustments would be either downward or upward in the event of a necessary, substantial road design change.

Under Section 41, Special Provisions, adjustments would be downward in the event of delay due to check scaling by the Government when that special provision has been included in the contract.

Section 3: Payment

43 CFR 5461-Contract Payments sets out the basic regulatory requirements for the payment provisions.

Section 3 of the contract is divided into eight subsections, all of which relate to payment for, or the manner of payment of, the total purchase price set forth in Section 2 of the contract.

Section 3(a): A contract executed on Form 5450-3 is a "lump-sum" contract. A "lump-sum" contract requires payment of a fixed dollar amount, regardless of the quantity of timber involved. This contrasts to a contract on a "scale" or "unit" basis where the total payment is dependent upon a measure of the quantity of timber actually removed.

If the total of the timber purchased is $500 or more in value, 43 CFR 5452.2 permits payment by installments. This regulatory requirement is brought forward into Section 3(b) of the contract. Sales for under $500 must be paid in full prior to the time the Authorized Officer signs the contract.

Section 3(b) provides space for setting forth the amount of the minimum installment payment. This amount varies with the total value of the contract. The regulations in 43 CFR 5461.2(a)(1) establish the minimum amount of installments. Such installments are based upon the value of the contract. The amount of the individual installment is expressed in both words and figures. Within the limits prescribed by the regulations, the various State Offices may establish payment schedules for information of bidders. Section 3(b) prescribes the sequence of installment payments. It specifies that the first installment must be paid on or before the date the contract is signed by the Authorized Officer, unless an increase bond rider to secure payment of the first installment is accepted by the Authorized Officer. In effect, the first installment must be paid or an increase bond rider provided to secure payment of the first installment within the time provided after the purchaser receives the contract for signature. The successful bidder is required by regulation to sign and return the contract, together with any required performance bond and payment, within a 30-day period unless additional time is provided. (See 43 CFR 5450.1(b).) Failure of the successful bidder to comply with these requirements within the stipulated time may result in forfeiture of his bid deposit.

Section 3(b) requires that the second installment must be paid prior to the cutting or removal of any timber sold under the contract, except as provided in Sections 3(d) and 3(e). Upon payment of the second installment, the purchaser may cut an amount of timber equal to that of a single installment. At that point the third installment payment is due. The installment payments continue in like manner until all payments have been made.

Installment payments according to Sec. 3(b) are due and payable without notice whenever the value of the timber cut equals the value of the second and subsequent installments. As a practical matter, however, the contract administrator must perform frequent inspections of the contract to assure that installment payments are timely. Exhibit B is used for determining when payments are due. (See Form 5450-3a on page 5 of this illustration.)

Section 3(c) provides the purchaser with the opportunity to delay payment of the first installment by submitting a performance bond increase rider. The rider must be on Form 5450-12, Increase Bond Rider to Secure Payment of First Installment of Timber Sale Contract, and must be accepted by the Authorized Officer. (See Illustration in BLM Manual 5450.) Cash payment of the first installment must be made by the purchaser before the cutting or removal of the last portion of timber having a value equal to the first installment. This delayed time for payment of the first installment is not changed when the purchaser elects to provide payment under a payment bond or a cut-but-not-remove increase performance bond.

Section 3(d) makes effective the provisions of 43 CFR 5451.2(b) and 43 CFR 5461.2(a)(3) which permit the cutting of timber in advance of payment of the second and subsequent installments under what is commonly referred to as the "cut-but-not-remove" bonding procedure. Section 3(d) and Section 38(c) are closely related and should be studied together.

The "cut-but-not-remove" procedure established by Section 3(d) is effective and beneficial in contracts where the purchaser wishes to cut a quantity of timber well in advance of removal. Use of this procedure permits the purchaser to conserve his operating capital because he does not have to make installment payments to permit cutting of the timber; instead, payments are made in advance of skidding or yarding to a loading point (refer to Section 5) or removal. The purchaser may elect to use this procedure at any time.

When the purchaser elects to cut timber against the bond, he informs the Authorized Officer of the approximate amount (value) of timber he wishes to cut in advance of payment. The purchaser must then arrange with his bonding company to increase his performance bond by that amount, in installment increments. (See 43 CFR 5451.2(b), and use Form 5460-3, Increase or Decrease Rider - Performance Bond.) For example, assume a contract with a total purchase price of $100,000, installment payments of $10,000, and a basic performance bond requirement of $20,000. If the purchaser in this example wishes to cut timber in advance of payment up to an amount of $40,000, it will be necessary for him to increase his basic performance bond by $40,000. Thus the total value of the performance bond required in this situation is $60,000. The increased bond is the Government's protection for cutting in advance of payment. Upon submission of a bond in this amount and written approval of the increased bond by the Authorized Officer, the purchaser may cut timber in advance of payment up to an amount $40,000. The purchaser may not, however, skid or yard to a loading point, or remove any of the timber cut pursuant to this procedure, until payment has been made.

Payment for the felled timber commences when the purchaser decides to skid or yard to a loading point or remove the timber cut under the "cut-but-not-remove" procedure. Upon payment of the second installment, the purchaser may skid or yard to a loading point or remove timber in an amount equal in value to the second installment. The third installment payment becomes due at this point and so on until all installment payments have been made.

The purchaser in this example must cease cutting timber when the value of the timber cut in advance of payment equals $40,000, i.e., the amount of the increase in his performance bond. In order to continue cutting in advance of payment, he must begin making installment payments or increase his bond to a greater amount. Upon payment of an installment, the purchaser may skid or yard to a loading point or remove timber in an amount equal to the amount paid. Payment also has the effect of advancing or reinstating the bond permitting the purchaser to cut an additional $10,000 of timber.

The purchaser may revert back to the payment in advance of cutting procedure (Section 3(b) of the contract) at any time during the life of the contract.

Section 3(e) provides for cutting and/or removal of timber in advance of payment of the second or subsequent installments, up to, but not exceeding, the penal sum of payment bond, provided in accordance with Section 38(e). A payment bond is, in effect, guaranteed cash payment for timber to be cut and can therefore be thought of as cash paid in advance to cutting. The amount of the payment bond is decided by the purchaser. Note that the payment bond is a guarantee to pay for timber which has been cut in advance of payment, together with related road maintenance fees, up to the penal amount of the bond and that payment for the timber cut under the payment bond is accomplished by a system of monthly billings for the timber as it is skidded or yarded to a loading point or removed from the contract area. Billings under this section are based upon contract inspections and value units shown on Exhibit B. Billings should include required road maintenance fees.

Payment is due within 15 days of the date of billing. The maximum time lapse between the date of skidding or yarding to a loading point or removal of timber and the date of payment for that timber could be a month plus 15 days. Under special circumstances, the purchaser and the Authorized Officer, may agree on a billing period shorter than one month.

In event the purchaser uses an increased cut-but-not-remove performance bond in tandem with a payment bond, the value of timber cut under the increased performance bond must be deducted from the total value of timber in advance of payment in order to determine the value of timber cut under the payment bond.

Section 3(f) provides for calculation of timber values in accordance with Exhibit B for the purpose of determining when payments are due.

Timber values are established by Exhibit B usually on a value-per-acre basis. This precludes arguments concerning such things as value cut because of distribution of high value species in the cutting areas or "high grade" selective logging performed by the purchaser. Exhibit B sets forth, prior to sale advertising, the computations which will be applied to the contract unit prices to determine the value per acre of timber subject to cutting, skidding or yarding, or removal. (See pages 5 and 6)

Section 3(g) requires that the total contract purchase price must be paid prior to the expiration of the time for cutting and removal of timber expressed in the contract. This means that the contract, to be in good standing, must be paid in full on or before the date the contract expires. If a contract extension has been applied for and duly extended, the total purchase price then becomes due prior to expiration of the contract as extended. This requirement is included in the contract to set forth a specific date during the life of the contract when the total purchase price must be paid in full.

Section 3(g) also specifies that payments are paid at the office of the Authorized Officer. Payments may be made in the form of cash, money order, bank draft, or check made payable to the Bureau of Land Management.

Section 3(h) provides for accrual of interest on overdue payments or other charges, beginning 15 calendar days after the payment due date. This provision makes it imperative that the contract administrator accurately prepare his determination of acreage and value cut, in accordance with Exhibit B. An accurate determination of the extent of the logging operations will preclude minor disputes concerning the amount of cutting, skidding or yarding, or removal.

Section 4: Time for Cutting and Removal

Section 4 of the contract specifies when the purchaser may commence cutting of the timber sold under the terms and conditions of the contract and when the purchaser's right to cut and remove timber ceases.

Cutting of timber may commence on the day the contract is signed by the Authorized Officer unless some provision of the contract restricts the operation dates of the contract or requires some other action by the purchaser before cutting can proceed. For example, the contract may require the purchaser to submit a logging plan or a fire prevention and control plan prior to cutting, or cutting may be restricted to a certain period of the year as in the case of some thinning sales. Under such circumstances, cutting and removal may not commence until some other contractual obligations have been satisfied.

The time for cutting and removal of timber sold under the contract is measured from the date the contract is signed by the Authorized Officer. This is commonly known as the approval date. Time for cutting and removal is always expressed in months. It is not correct to specify a date in the space provided. The number of months of the contract is expressed in both words and figures, i.e., "thirty-six (36)" months.

The contract allows the timber to be cut and removed during the period specified. There is no grace period after the expiration of the time for cutting and removal within which the purchaser can remove felled timber. The maximum permissible time for cutting and removal is 36 months. (See 43 CFR 5463.1, Time for Cutting and Removal.) The Authorized Officer may limit the time for cutting and removal to a lesser period. The time for cutting and removal for a particular sale shall be specified at the time of advertising. The time for cutting and removal may be extended under certain conditions as provided by Section 9 of the contract.

Section 5: Definitions

This section defines three terms used in the contract.

Section 5(a) defines "Authorized Officer," which is used repeatedly throughout the contract. It means "any employee of the Bureau of Land Management to whom has been delegated authority to take action in connection with . . . ." a contract. This same definition appears in 43 CFR 5400.0-5 of the timber sale regulations.

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The delegations and redelegations of authority are set forth in the Departmental Manual, Part 235, and Bureau Order No. 701 dated July 23, 1964, as amended. In the Departmental Manual, the Secretary delegates to the Director authorities concerned with lands and resources. By the same token, the Director, Bureau of Land Management, uses Bureau Order No. 701 to redelegate to the State Directors, District Managers, and certain other land and resource management authorities.

Within Bureau Order No. 701, the following sections are relevant to timber sales:

> "Sec. 1.8 Forest Management. The State Director may take the following actions: (a) Disposition of forest products. (1) Dispose of or permit the free use of forest products when authorized by law on lands under the jurisdiction of the Bureau of Land Management. This authority shall not include the approval of any sale of timber in excess of 25,000,000 feet, board measure.
>
> "Sec. 3.8 Forest Management. The District Manager may take all actions on: (a) Disposition of forest products except sales in excess of 10,000 feet board measure must be approved by State Directors or their delegates prior to advertisement."

Pursuant to Section 1.1a of Bureau Order No. 701a, a State Director may redelegate any authority vested in him by this order to any qualified employee under his jurisdiction. Such redelegation must be approved by the Director and published in the Federal Register. When such action is contemplated, the requirements of Section 1.1a must be strictly adhered to.

Section 5(b) defines "timber" and by so doing it defines in broad terms the product being sold. The definition of timber in Section 5(b) also appears in 43 CFR 5400.0-5 of the timber sale regulations. Timber is defined in terms of products measurable in or convertible to board feet such as saw logs, peeler logs, pulpwood, fence posts, and corral poles. Christmas trees, cones, ferns, huckleberry bushes, manzanita boughs, etc., are not measurable, and not convertible to board feet.

As a rule of thumb, any product reportable in the annual reports of the Director which has a conversion to board feet may be sold, using Form 5450-3. Sales of forest products not measurable in board feet cannot be made on Form 5450-3.

Section 5(c) defines the term "loading point" for the purpose of determining when payment is due in accordance with Section 3(d) and 3(e).

Section 6: Inspection of Timber and Disclaimer of Warranty

The timber sale advertising includes a listing of estimated sales volumes and, frequently, a breakdown of expected log grade recovery. The purpose of the purchasers warranty of examination and inspection, Section 6(a), and the "disclaimer of warranty," Section 6(b) is to preclude the purchaser from making a claim against the Government in the event quantity, quality, or fitness of the timber are not up to his expectations. Sections 6 reinforces the "lump sum" concept of the contract as set forth in Section 2.

The final sentence of Section 6(b) limits the purchaser to recovery of the single stumpage value of timber for failure of title to any timber sold under the contract. The value is based on unit prices set forth in Exhibit B. Failure of clear title as used in this contract occurs when the Government cannot produce title to timber which has been designated for taking and included in the sale by error. For example, if trees on private property are erroneously marked by BLM employees for cutting, or contained within the cutting boundary, and such trees are included in the sale, the Government is obligated to make an adjustment in the purchase price upon submission of a claim by the purchaser. In this sense, title to certain timber failed because the Government did not own the timber which it purported to sell.

Section 7: Passage of Title and Risk of Loss

It is important to set out in the contract the precise time when title passes from one party to the other. Title to the timber passes from the Government to the purchaser when the timber has been paid for and removed from the contract area. In the case of either cut or uncut timber sold and paid for under terms of the contract, title for a load of logs passes to the purchaser at the precise time that the logging truck leaves the contract area. Note that Sec. 38(e) provides that a payment bond shall be considered as payment under Sec. 7 for the purpose of passing title and risk of loss.

Risk of loss for timber sold under the contract is handled somewhat differently than passage of title. Risk of loss also differs depending on whether the sale is of uncut blowdown and standing timber or "cut timber." The distinctions are as follows:

Sale of Uncut Timber

Usually, sales are composed of timber which is either standing or down but has not been severed from the stump. The risk of loss for uncut standing or down timber is with the Government. On the other hand, the purchaser bears the burden of loss for timber in this category when he cuts (severs) such timber from the stump even though title to the timber remains with the Government.

However, the purchaser is relieved from risk of loss from fire in timber which he has cut if the fire is not an operation fire, that is, a fire caused by lightning, by a hunter or fisherman, or an escaped fire burning onto the contract area, etc. There would be no relief from risk of loss because of fire resulting from the purchaser's actions or caused by his operations, whether negligent or non-negligent.

Sale of Cut Timber

The sale of "cut timber" is a sale of logs or of trees which have been severed from the stump prior to the sale date. Risk of loss for cut timber sold under the contract is borne by the party holding title and includes situations involving use of payment bonds and passing title as stated in Section 38(e). If a deck of logs sold to the purchaser was destroyed by fire before removal from the contract area, the Government must bear the loss and adjust the total purchase price accordingly.

Section 8: Sales of Additional Timber

Section 8 of the contract relates to the sale of additional timber to the contract. Additional sales of timber to a contract are made for varying reasons. For instance, it may be necessary to widen a right-of-way to facilitate road construction, or reserve timber on the contract area may windthrow during the life of the contract and it is most expedient to have the purchaser remove it.

Additional sales are negotiated sales within the strictest sense and therefore come within the provision of 43 CFR 5402.0-6. There is no volume or value limit to additional sales provided the Authorized Officer determines the sale to be in the public interest and provided that it is impracticable to offer the timber competevively. (See 43 CFR 5402.0-6(c)(2).)

The purchaser must agree with the Authorized Officer that the additional timber should be removed. The Authorized Officer cannot unilaterally require the purchaser to purchase additional timber.

The purchaser may not cut and remove additional timber until such time that the timber has been properly designated by the Authorized Officer and written permission has been granted. The price for the additional timber is established by the Authorized Officer in accordance with BLM prescribed procedures and the purchaser so notified.

The value of the additional timber is added to the total purchase price of the contract and payment for such timber is handled in one of two methods, depending on the circumstances. Briefly, the circumstances are as follows:

(1) If installment payments have not been completed, the value of the additional timber may be added to the total purchase price of the contract and the installment payments must continue until the total purchase price, including the value of the additional timber, has been paid in full.

(2) If all installments have been made, i.e., the total purchase price paid in full, payment for the additional timber must be in advance of cutting.

Section 9: Extension of Time and Reappraisal

Section 9 of the contract sets forth the requirements for an extension of the time for cutting and removal of timber sold pursuant to the contract. Occasionally, the purchaser will not be able to complete cutting and removal of timber from the contract area within the time limits specified in Section 4. In that event, the purchaser may apply for an extension of time. Basic authority for an extension of contract is set forth in 43 CFR Subpart 5463.2 and 5473.1 - Extension of Time for Cutting and Removal.

There are three basic requirements which have to be met in order for the Authorized Officer to view favorably an application of the purchaser for extension. These requirements are as follows:

(1) Written application for extension must be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in the contract.

(2) The purchaser must show that his failure to cut and remove the timber within the specified time was due to causes beyond his control.

(3) The timber remaining on the contract area must be reappraised.

Failure of the purchaser to make a timely filing of an application for extension may deprive the purchaser of his rights to an otherwise valid application for extension. The regulations set forth in 43 CFR 5473.1 are unyielding in interpretation when they say that "Written requests for extension must be received prior to the expiration of the time for cutting and removal."

It is incumbent upon the purchaser to establish that the delay for cutting and removal of timber was due to causes beyond his control. It is the responsibility of the Authorized Officer to weigh carefully the reasons offered and arrive at a decision to either grant or deny the request. Acts of God, such as fire, wind, and flood, which prevent the purchaser from completing the contract will, under normal circumstances, constitute a justifiable reason for granting an extension. Labor strikes, which oftentimes are beyond the control of an operator, may constitute a valid reason. In the case of timber markets, both the regulation 43 CFR 5463.2 and Section 9 of the contract specifically state that "market fluctuations are not cause for consideration of contract extensions." Poor performance by the purchaser is not a valid reason for extension. The rejection or approval of an application for extension must be based upon a careful evaluation of the circumstances of each and every case.

When the Authorized Officer determines that an extension is justifiable, he must then reappraise the timber remaining in the contract area. Section 7 states that title to the timber remains with the Government until it has been paid for and removed from the contract area. Thus, all timber remaining on the contract area, whether standing or cut, must be reappraised; timber cut by the purchaser is reappraised as standing timber. The appraisal must not attempt to capture any investment of the purchaser in falling, bucking, yarding, etc., which may enhance its value. The reappraisal must be made and completed as of the last day of the contract or as soon thereafter as is reasonably possible. Circumstances of weather, etc., may dictate some deviation from this instruction. Appraisal procedures must conform to prescribed procedures of the Bureau.

The regulations set forth in 43 CFR 5473.4-1(b) requires that "The reappraised total purchase price shall not be less than the total purchase price established by the contract or last extension." If the reappraisal indicates a value less than the total purchase price expressed in the contract the purchaser is obliged to pay the greater amount. A reappraisal in connection with an extension application may never reduce the total purchase price of the contract.

The Authorized Officer may require the reappraised total purchase price to be paid in advance as a condition of granting an extension. Such may be the case if the values remaining to be paid are small or in the event the Authorized Officer has experienced payment difficulities with the purchaser. Normally, however, the contract extension will permit a continuation of the installment payment provisions of the contract.

Section 10: Violations, Suspension, and Cancellation

Section 10 sets forth the action or remedies available to the Government in the event of a violation of any of the provisions of the contract by the purchaser. The section is divided into four subsections.

Section 10(a) permits the Authorized Officer to suspend the contract for any violation of the contract by the purchaser. The suspension must be by written notice and must detail the reason or reasons for the suspension. Operations on the contract necessary to remedy the violations are permissible. In the event the purchaser fails to remedy the violation within 30 days of receipt of the suspension notice, the Authorized Officer may take steps to cancel the contract and such action as necessary to recover damages suffered by the Government because of the violation. An exception to this time schedule occurs in the event of nonpayment, when due, of payment guaranteed by a payment bond. In such cases, written suspension should be issued promply when payments due have not been received. At the same time, demand should be made upon the surety for payment. Under the provisions of the payment bond and Section 10(a), the surety has 60 days after demand upon it to take whatever steps it finds necessary in order to accomplish the required payment. Cancellation action can be taken after the 60-day period if no payment is received.

The decision by the Authorized Officer to suspend a contract is a serious decision. Generally speaking, a contract should not be suspended until it is clearly apparent that such action is necessary to stop a contract violation. The contract should not be suspended without prior consultation with the purchaser regarding the nature of the violation. Suspending an operation can have a serious effect on items such as the purchaser's operating costs, the stability of his work force, or the continuity of essential log flow to a milling facility. Contract suspension is a powerful means to enforce the terms of a contract. The Authorized Officer must exercise judgement in the use of this provision and never use it indiscriminately.

Section 10(a) also relates to the cancellation of a contract in the event of failure of the purchaser to comply with the terms and conditions of the contract. Cancellation of a contract and recovery of damages by the Government is a specialized legal matter which requires legal counsel and such action is taken only following review and assistance by the State Director. Contract cancellation has significance only when timber remains to be cut and removed.

Section 10(a) also states clearly that a contract cancellation is a cancellation of the rights of the purchaser. The contract obligations of the purchaser remain when a contract is cancelled.

Section 10(b) adds force to Section 10(a). Section 10(b) makes it clear that the purchaser must stop his timber cutting and removal operations when given written notice of suspension of operations. If the purchaser cuts and removes timber during the period of suspension, such cutting and removal is considered a wilful trespass. This is important because several States have laws prescribing multiple damages (double or treble damages) for wilful trespass. The possibility of payment of multiple damages is a strong deterrent to continuation of cutting and removal operations by the purchaser during a period of suspension.

Section 10(b) also establishes a procedure for credit against the total damages due the Government when there has been prior payment for trespass timber.

One of the most frequent contract violations is a failure to make installment payments when due before cutting or before removal under an increased bond. Most violations of this sort are short-lived and are remedied by prompt submission by the purchaser of another installment payment. Under such circumstances, suspension of the contract is a rarity. However, there can be instances when the purchaser habitually will not make timely payments. When aggravated cases such as this occur, the Authorized Officer has the discretion under Section 10(c) of the contract to suspend the contract and to require the purchaser to pay the entire remaining balance of the contract as a condition of lifting the suspension. If timely installment payment is not received in 15 days following billing for timber skidded, yarded, or removed under a payment bond, then suspension and demand on the surety should be prompt.

Section 10(d) requires the purchaser to cooperate in the investigation of the cutting, injury, or removal of timber reserved from cutting under the terms and conditions of the contract. If the purchaser fails to cooperate in the investigation, the Authorized Officer may suspend any portion or all of the operation as necessary to prevent the destruction of evidence of trespass by the logging operations. Though infrequently used, the contractural protection provided by Section 10(d) may be very necessary.

Section 11: Credit Against Purchase Price

Section 11 of the contract states to what extent a purchaser is entitled to credit against the total purchase price for timber left on the contract area after the cutting and removal rights have expired or the contract has been cancelled. The amount of the credit is limited to the total market value of the timber as established by the Authorized Officer by reappraisal or resale, or the total value based upon contract unit prices, whichever is less.

Defaulted timber sale contracts should be completely reviewed prior to reoffering the same tract for sale to establish market value of the remaining timber. Determine if significant changes in the contract terms are needed to protect the best interest of the United States. Any significant change in the contract terms would require that damages be based upon an appraisal which considers the resale price, but not necessarily reflects it.

The administrative costs of resale are charged to the purchaser. Administrative costs include costs of cruise and reappraisal, other field costs, costs of advertising, clerical time, etc.

(Refer to BLM Manual 5483 for instructions regarding cancellation of contracts and determination of damages.)

As an illustration of this procedure, assume a purchaser was awarded a timber sale contract for a total purchase price of $100,000 and made the first installment of $10,000. The purchaser allowed his cutting and removal rights to expire without cutting any timber. The purchaser then owes the Government $100,000 less any credit for the value of the timber, plus the administrative costs of resale, less installment payments. Upon resale by the Government, the timber sold for $65,000, and the costs of resale were $1,000. The purchaser would be granted a credit of $65,000 for the value of the remaining timber, $10,000 for the first installment, less the resale costs of $1,000 resulting in a net credit of $74,000. Thus, rather than being assessed the full $100,000 contract price, the purchaser would owe only $26,000, representing the difference between $100,000 and $74,000. Demand is made upon the purchaser and his surety for the amount of these damages.

The Government is entitled to retain all monies paid on a defaulted contract until such time as the amount of damages has been determined. The Government is then entitled to retain only that amount which makes it whole; it is not entitled to retain both the remaining timber and payments on the purchase price which are in excess of its damages.

As an illustration, assume the same circumstances as shown in the preceding paragraph except that the remaining timber sold for $110,000 rather than $65,000. The purchaser would be granted a credit of $100,000 for the value of the remaining timber, $10,000 for the first installment, less the resale costs of $1,000, resulting in a net credit of $109,000. Since this is more than the total contract purchase price, the purchaser would be given a refund of $9,000, thus making the Government whole. This and other examples of case situations are shown on the chart on the following page.

Section 12: Responsibility for Damage Suffered, Cost, or Expense Incurred by Government

Section 12 is a standard provision of the contract which establishes that the purchaser is responsible and liable for damage or expense incurred by the Government by reason of breach of contract or wrongful or negligent acts. The provision also requires the purchaser to pay to the Government, on written demand, such damages. More frequently, the purchaser repairs the damages rather than making a cash settlement.

For example, the purchaser may be negligent or derelict in the performance of his road maintenance responsibilities required by the contract and such negligence leads to a failure in the road. The purchaser is responsible for such damage. Another case might involve road construction which appears to meet contract requirements until a failure reveals such construction practices were, in actuality, wrongful and negligent. Under such circumstances, the purchaser will be liable even though the Authorized Officer may have accepted the construction in accordance with Section 18.

Significantly, the action leading to the damage must be by a breach of contract or wrongful or negligent act of the purchaser, his contractors or subcontractors, or the employees of any of these.

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Examples of Case Situations

Total Purchase Price	$100,000	$100,000	$100,000	$100,000
First Installment	10,000	10,000	10,000	10,000
Total Payments	10,000	10,000	90,000	90,000
Value of Timber Removed	0	0	90,000	90,000
Contract Value of Remaining Timber	100,000	100,000	10,000	10,000
Total Market Value of Remaining Timber	65,000	110,000	8,000	12,000
Credit Value of Remaining Timber	65,000	100,000	8,000	10,000
Cost of Resale	1,000	1,000	1,000	1,000
Net Credit Value of Remaining Timber	64,000	99,000	7,000	9,000
Net Credit Value Plus Payments	74,000	109,000	97,000	99,000
Purchaser Owes	26,000	-------	3,000	1,000
Refund	------	9,000	-----	-----

Section 13: Timber Trespass

Section 13 is the standard provision of the contract which relates to timber trespass. The provision makes the purchaser, his contractors, subcontractors, or employees of any of them, responsible for the cutting, injury, or removal of any timber other than that which has been sold under the terms of the contract. The provision provides that damage for timber trespass will be assessed in accordance with the laws of the State in which the trespass occurred. In States which permit assessment of multiple damages, it is to the advantage of the Government to seek damages pursuant to State law. Section 13 permits this course of action. Damages are to be paid by the purchaser upon written demand of the Authorized Officer.

This provision is not limited in application to timber trespass which occurs on the contract area but may be applied to enforce payment for timber trespass damages which occur off the contract area but in connection with operations under the contract. In the event the purchaser fails to pay and demand for damages must be made under the performance bond, multiple damage demands should be reviewed by the Field or Regional Solicitor.

Section 14: Protection of Utilities and Improvements

Section 14 relates to the protection by the purchaser of utilities and improvements on the contract area during the course of logging operations, and includes the protection of transmission lines, roads, trails, ditches, etc. Protection of utilities and improvements is not limited to Government-owned utilities and improvements, but includes private ownership as well.

The provision states that damage to utilities and improvements shall be promptly paid for or repaired by the purchaser. Normally, damage to privately owned utilities are repaired by their owners and damages assessed the purchaser. Damage to Government-owned improvements are generally repaired by the purchaser to the satisfaction of the Authorized Officer.

The Authorized Officer is provided with the authority to designate certain roads and trails for special maintenance when needed for fire protection. This is in relation to the purchaser's construction or logging operations under the contract.

This provision is broad enough to cover most improvements. However, if an improvement requires special protection, it should be covered by special instructions under Section 41, and shown on Exhibit A.

Section 15: Fire Prevention and Slash Disposal

Section 15 is the basic provision of the contract relating to fire prevention and fire suppression on the contract area and other adjacent Government lands or Government lands used or traversed by the purchaser in connection with his operations under the contract. It places a direct responsibility upon the purchaser to abide by the applicable laws and regulations relating to fire prevention and suppression. In the absence of Federal laws or regulations specific to fire, the purchaser must abide by the laws of the State within which the lands to be protected are located. In addition, the Authorized Officer may require the purchaser to provide special fire prevention or control measures at any time during the life of the contract when conditions for fire are hazardous.

Section 15 requires disposal of logging slash in accordance with a plan approved by the Authorized Officer. The Authorized Officer must plan for and direct slash disposal in a manner which is consistent with the forest management objectives of the Bureau of Land Management as well as established air quality rules and regulations.

Since Section 15 covers fire prevention and suppression and slash disposal broadly, it is usually necessary to add special provisions under Section 41 to accomplish specific requirements. For example, when State laws or rules do not meet minimum BLM requirements for fire equipment, the necessary equipment must be required under Section 41, or when special slash disposal methods are to be used, they must be set forth under Section 41.

Section 16: Construction, Use, and Maintenance of Roads and Facilities

Section 16 relates to the construction or use of roads and facilities not otherwise covered by the contract.

The provision permits the purchaser, subject to approval by the Authorized Officer, to use roads in existence, the use of which is not otherwise authorized by the contract. The purchaser may also construct roads, subject to the approval of the Authorized Officer, which are necessary to his logging operation. Section 16(a) should be used to control the amount, location, and standards of purchaser-proposed roads. By and large the provision is to include roads for which the purchaser has incidental use and for which construction of temporary spur roads is necessary. Primary road use and construction must be covered in Section 41.

Section 16(b) establishes the purchaser's responsibility for maintenance or repair of the roads he uses under the terms of the contract. Standards for required purchaser maintenance must be stated in Section 41 of the Special Provisions. The purchaser's maintenance responsibility begins at commencement of operations and ends at completion of operations, except for slash disposal. The purchaser would not be relieved of responsibility for maintenance and repair of damages resulting from his slash disposal activity or for maintenance and repair responsibility during shut down periods occurring between his operating periods. The purchaser's maintenance and repair responsibility will span the time of his total operations on the contract. He will not be relieved of such responsibility for road segments or for roads in completed portions of the total contract area. The purchaser would not be responsible for repair of wear or damage when caused by third-party users or when the required maintenance exceeds the standards established under Section 41.

After the contract is approved situations may arise where the Bureau must perform road maintenance or repairs in order to permit use of the road by the purchaser. When maintenance funds are not available, the Authorized Officer should accomplish this action through modification of the contract and reduction of the total purchase price. If the contract has been paid in full, make a refund in accordance with BLM Manual 1374. If the maintenance costs are excessive, the Authorized Officer may consider cancellation of the contract or request additional appropriated funds if the road is needed for management purposes.

Section 17: Limitations of Road Use

Section 17 imposes limitations on the purchaser's right to use existing roads described in Section 41 or new roads to be constructed pursuant to the terms of Section 41.

Section 17(a) limits the purchaser's use of existing roads or roads constructed under the terms of the contract to the removal of timber sold under the contract. The purchaser may not haul private timber over these roads in connection with operations under the contract. The purchaser does have a right to use such roads for the removal of private timber when a right-of-way has been granted pursuant to 43 CFR 2800.

Section 17(b) allows the Authorized Officer the discretion to require the purchaser to discontinue use of roads described in the contract when such continued use will cause excessive damage to the roads. For instance, hauling heavy loads of logs over a road subjected to alternate freezing and thawing in the early spring can cause very serious damage to the road. Under such circumstances the Authorized Officer may wish to terminate use of the road until the conditions for use improve. Other types of weather conditions may require similar action. The contract requires that the Authorized Officer issue a written notice to the purchaser when use of the road is to be discontinued. Here again, good practice suggests that the Authorized Officer discuss the matter thoroughly with the purchaser before taking action.

Section 18: Acceptance of Road Construction

Section 18(a) provides that the purchaser will be granted written acceptance of road construction required by the contract upon its completion to the satisfaction of the Authorized Officer. When written acceptance is given the purchaser, it serves to release him from further duty or liability for the construction or reconstruction of the road. For example, if upon completion of a road by the purchaser and acceptance of the construction by the Authorized Officer, a flood, or landslide, or other natural phenomenon destroys the road, the purchaser is not required to rebuild the road or restore it to usable condition at his expense. Rather, the Government stands the loss.

There is an exception to the release from liability for construction and this is tied directly to Section 12 of the contract. If the failure of the road is due to a breach of contract or the wrongful or negligent acts of the purchaser, his contractors, subcontractors, or the employees of any of them, the release from liability is of no effect and the purchaser is required to pay for or repair the damage.

Section 18(a) should be applied as follows: When the purchaser has completed road construction pursuant to the terms of the contract, he so advises the Authorized Officer in writing. Upon receipt of the written notification, the Authorized Officer must promptly inspect the road. If road construction meets the contract requirements and is satisfactory to the Authorized Officer, he provides the purchaser with a written notice of acceptance. If road construction is unsatisfactory, the Authorized Officer must point out the deficiencies to the purchaser. When deficiencies have been corrected, the purchaser must again notify the Authorized Officer in writing and request an inspection.

Section 18(b) requires that the purchaser remain responsible for the maintenance of accepted roads in accordance with the provision of Sections 16 and 41 of the contract. Maintenance of roads constructed under the terms of the contract must be spelled out in Section 41.

Section 19: Cost Adjustment for Physical Changes

Section 19 prescribes dollar levels for BLM sharing in the cost to repair major physical damages, due to a single event, which occur on a road being constructed, but prior to its acceptance by BLM. The purchaser, therefore, does not have the full responsibility for repair of road damages occurring before acceptance of the road construction. The Disaster Relief Act (Public Law 91-606) and 43 CFR 1815.1-1 provides for relief in the event of damage due to a major disaster, as determined by the President. Section 19 brings the concept of the Disaster Relief Act into our contract by providing for Government sharing in the cost of repair of major physical changes due to a single event such as a local flood, intense rainstorm, a mass soil movement, or a large fire. An event can be local in nature and cost sharing can follow without a "major disaster" determination by the President.

The Government has three options for meeting its share cost of the additional work: reduction of the purchase price through contract modification, or payment of the cost to the purchaser, or performing its share of the work.

There must be advance approval by the Authorized Officer for the additional work or the purchaser will not be eligible for cost adjustment.

In the event the Government's share would be so great as to be not economically justifiable, the contract should be reviewed with the State Director.

Under normal circumstances, the preferred method is adjustment of the contract price. If the contract has been paid in full, make a refund in accordance with BLM Manual 1374.

Section 20: Design Change

This section establishes a procedure for accomplishing necessary design changes in contract construction or improvement requirements for roads, road structures (culverts, etc.), or bridges. A design change costing $1,000 or more is considered to be a change of substantial nature and the cost will be borne entirely by the Government. Agreement must be reached between the purchaser and the Authorized Officer concerning the changed conditions, the remedy, and related costs prior to effecting the change. This provision could be utilized to remedy gross design errors, but can be even more important as a procedure for remedy of unanticipated environmental complications.

A design change can result in an increase or decrease in the purchase price, and cause more or less work than originally planned in the contract. If the contract has been paid in full, make a refund in accordance with BLM Manual 1374.

Section 21: Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser

Section 21 of the contract establishes the purchaser's responsibility for completing work required by the contract even though his rights to cut and remove timber as specified in Section 4 and his rights to remove personal property as specified in Section 39 have expired. Also, all provisions of the contract for the benefit and protection of the Government and third parties remain in effect until the contract is terminated by the Government.

For example, slash disposal may carry over for several years for any number of reasons. If during the slash burning his fire should escape and destroy power poles of a privately owned transmission line in the contract area, the provisions of Section 14 would still apply.

The purchaser cannot escape performance for the benefit or protection of the Government and third parties by permitting his rights to expire. A contract should not be terminated by the Authorized Officer until all obligations of the purchaser to either the Government or third parties have been performed.

Section 22: Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees

In the preparation of a sale, BLM foresters should take the time necessary to adequately identify the various survey monuments, corners, and accessories found on the contract area so that the purchaser will recognize them. It may be necessary to call attention to specific survey markers which need special protection. Because of the importance of the Public Land Surveys, the Authorized Officer should do all that is possible in advance of the sale to assure protection of the survey.

Section 23: Purchaser's Representative

Section 23 states that the purchaser is required to designate a representative who will be on the contract area during logging or construction operations and shall authorize him to receive instructions from the Authorized Officer.

It is the exception rather than the rule when the purchaser is personally active on the contract area other than on an occasional basis. Usually, his business interests divide his time and his visits to the contract area are sporadic or he subcontracts the logging and construction to some other firm. To properly administer a timber sale contract, the Authorized Officer must have available a representative of the purchaser on the contract area to talk to about the contract. The Authorized Officer must not be faced with the situation of searching for the purchaser. The Authorized Officer must be able to talk to a person on the ground with some assurance that instructions will be followed or reported to the purchaser.

At the outset of the contract the Authorized Officer should request the purchaser to identify the individual who will act in the capacity of the purchaser's representative.

Section 24: Simultaneous Use of Contract Area by Others

Section 24 of the contract permits the simultaneous use of the contract area by others if the Authorized Officer determines that such use will not seriously interfere with the operations of the purchaser. This means that the Authorized Officer can issue a permit, lease, or contract to another party for some purpose covering all or part of a timber sale contract area. For example, the contract area may include lands suitable for grazing. If grazing of the contract area will not seriously interfere with the purchaser's logging operations, the Authorized Officer may include the lands within the contract area in a grazing lease.

Simultaneous use of the same area for differing or competing uses is not encouraged. Timber sales contracts are of relatively short duration. Therefore, it is usually best to delay issuance of any lease, permit, or contract for competing uses until the timber sale contract is terminated.

Section 25: Watershed Protection: Water Quality, Erosion Control, and Soil Damage

Section 25(a) specifically requires the purchaser to comply with applicable State and Federal laws and regulations pertaining to water quality. In sale layout and contract preparation it is imperative that we do not force the purchaser into an untenable position where he would violate State or Federal law to comply with contract requirements. Special contract provisions for timing of road and bridge construction, culvert installation, and logging are essential in critical situations involving water quality standards. Close coordination with proper State or Federal officials will be necessary during the planning for operations which will cause temporary water quality degradation.

Section 25(b) requires the purchaser to take every reasonable precaution not to pollute. The determination of what is or is not reasonable is a judgement factor and must be decided on a case-by-case basis. This section also enables us to enforce correction of conditions off the contract area resulting from the purchaser's operations. When such damage occurs on other than BLM-administered lands, the administering agency or landowner must be contacted prior to taking corrective action.

Section 25(c) requires the purchaser to take every reasonable measure to minimize erosion and soil damage. It specifically states that construction of water bars on yarding roads and spur roads is a reasonable precaution.

Section 25 is the basic contract provision relating to stream clearance and water bar construction. Use special provisions in Section 41 to deal with unusual problems which are anticipated.

Section 26: Refuse Control and Disposition of Waste Materials

Section 26 provides for control of the disposal method and approval of the disposal site for refuse, etc. The Authorized Officer cannot prescribe disposal sites on lands controlled by others. Special emphasis is placed on the prevention of pollution of a watercourse or waterway during the disposal process. Disposal should be timely. Refuse should not be allowed to accumulate until the end of operations.

Section 27: Storage and Handling of Hazardous Materials

Section 27 requires action for protection of the environment. Toxic or volatile materials which are stored must be suitably contained and located so as to avoid contamination of water in the event of spillage. If a suitable storage location is not available, the stored material must be located within suitable containment dikes. Storage, under this provision, will not be interpreted to include the fuel tanks on trucks or logging equipment.

Section 28: Safety and Health

Section 28 requires the purchaser to conduct his operations in accordance with applicable laws, codes, and regulations regarding safety, health, and sanitation. For example, the purchaser must comply with existing safety requirements for the control, storage, and handling of blasting materials and industrial chemicals. The purchaser will also be required to comply with State safety codes during operations.

Logging operations present certain hazards, both from the size and type of equipment being used and the nature of the product being removed. Safety relates to the well-being of all people who have occasion to be on the contract area: the purchaser, his employees, the public, and Government employees.

Section 29: Equal Opportunity

Section 29 is an important aspect of the contract. The Authorized Officer is required to furnish the purchaser with certain forms and notices to permit his compliance. The Authorized Officer and his designated representatives should be generally familiar with Executive Order No. 11246; dated September 24, 1965. Finally, the Authorized Officer must be alert to instances of noncompliance by the purchaser with the provisions of Executive Order No. 11246 as they apply to timber sale contracts.

Section 30: Records and Reports

This section is the authority for the Authorized Officer to request certain reports from the purchaser. The type of information which the purchaser is required to furnish is self-explanatory.

Section 31: Unsatisfactory Bond

Section 31 of the contract permits the Authorized Officer to require the purchaser to furnish a new bond whenever any prior bond furnished to him becomes unsatisfactory.

Unsatisfactory bonds are usually associated with the termination of a "Certificate of Authority as Acceptable Surety on Federal Bonds" issued by the Treasury Department of the United States to acceptable surety companies.

Section 32: Assignments

An assignment is the transfer of rights and responsibilities from one person or firm to another. A contract executed on Form 5450-3 may be assigned from the purchaser to another party. Section 32 of the contract sets forth the requirements which govern an assignment. Basic authority for assignment of timber sale contracts is found in BLM Manual 5474.

Section 32(a) specifies that an assignment may not be made without the approval of the Authorized Officer. This requirement permits the Authorized Officer to screen the assignee to determine his qualifications. The Authorized Officer should not approve assignment to an assignee who will not qualify as an original purchaser. Qualification of bidders and purchasers are set forth in 5474. For example, a purchaser must be a citizen of the United States; thus the Authorized Officer should not approve an assignment to an alien. Section 32(a) also stipulates that an assignment shall contain all the terms and conditions agreed upon by the original purchaser and the Government. In other words, the assignment will not serve to avoid the conditions of the contract.

Section 32(b) sets forth certain criteria for consideration of the Authorized Officer in evaluating an assignee. The assignee must be authorized to transact business in the State in which the timber is located. This has practical application in the case of a corporation. (See 43 CFR 5441-1). The Authorized Officer may require the assignee to submit such information as is necessary in order to judge his ability to perform the contract. This may require a filing by the assignee of financial statement, partnership agreements, corporate documents, etc., as the case may be. The assignee is also required to furnish a new performance bond, or a consent of surety, as required by Section 38.

Section 32(b) states that the assignor (purchaser) is released from any further liability for performance under the contract upon approval of the assignment by the Authorized Officer. This, in effect, is an unconditional release of the original purchaser from responsibility for any of the obligations of the contract.

Section 33: Contingent Fees

Section 33 of the contract contains language required in a Government contract by law.

If the Authorized Officer learns of a misrepresentation, violation, or breach under this provision, the State Director and Regional or Field Solicitor should be contacted.

Section 34: Successors in Interest

Section 34 puts successors in interest, i.e., transferees or assignees, on notice that all obligations of the contract shall apply to them.

Section 35: Exercise of Rights or Duties of the Authorized Officer

Section 35 of the contract permits the Authorized Officer to designate a representative to exercise his rights or duties under the contract.

Section 5 defined the Authorized Officer as any employee of the Bureau of Land Management to whom has been delegated authority to take action. This employee is, almost without exception, the District Manager or Area Manager in matters involving timber sales.

As a practical matter it would be difficult, if not impossible, for a District or Area Manager to personally carry out all the details attendant to proper adminsitration of a timber sale contract. The District Manager or Area Manager must be able to designate a representative or contract administrator to oversee the contract. The designated representative of the Authorized Officer should be identified in writing to the purchaser.

As a matter of policy, the exercise of the rights or duties by the designated representative is limited to supervisory functions and routine administrative matters. The Authorized Officer cannot delegate his signing authority, as such, and he must sign all major actions under the contract. Examples of major actions are contract modifications, suspension notices, demands for damages, approval of assignments, contract extensions, formal acceptance of road construction, etc.

Section 36: Officials Not To Benefit

Section 36 is included in the contract as a matter of law. In effect it prohibits any member of, or delegate to, Congress, or Resident Commissioner, or officer, agent, or employee of the Department of the Interior from profiting from the contract in any way. This provision is self-serving and the Authorized Officer does not have a primary administrative function in its enforcement. Violation of the provision will in all probability be brought to the attention of the Authorized Officer by an investigative agency of the Government.

Section 37: Appeal

The purchaser has the right under Section 37 of the contract to appeal any decision of any officer of the BLM which adversely affects him. In other words, any decision of the Authorized Officer with which the purchaser feels he has a valid objection may be appealed to the Board of Land Appeals.

Section 37 of the contract serves to protect the purchaser from arbitrary and capricious action by the Authorized Officer.

The filing of an appeal by the purchaser and handling of the appeal by the receiving office is a very precise action. Contract administrators should become familiar with the procedures for filing an appeal as found in 43 CFR Part 4, Subpart E.

Section 38: Bond

Section 38 of the contract is divided into fiver subsections as follows:

(a) States the amount of the performance bond required by the contract.

(b) Provides for increasing the performance bond to secure delayed payment of the first installment.

(c) Provides for increasing the performance bond to insure payment in the event of cutting, but not skidding or yarding to a loading point or removal, before payment.

(d) Provides for reduction in the performance bond as contractural items are completed, forfeiture of the performance bond for failure to perform, and cancellation of the bond upon satisfactory performance of the contract.

(e) Provides for a payment bond to guarantee payment after cutting and/or removal of timber.

It is important to note that the purchaser can elect to use any or all of the bonding opportunities provided by Sections 38(b), 38(c), and 38(e) on a contract.

Acceptable performance bonds specified in BLM Manual 5451 are:

1. Bond of a corporate surety.
2. Personal surety bond.
3. Cash bond.
4. Negotiable securities of the United States.

The types of bonds acceptable as payment bonds are:

1. Bond of a corporate surety.
2. Negotiable securities of the United States.

NOTE: All of the above bonds must be executed on an approved form.

Space is provided in Section 38(a) for entry of the amount of the performance bond required for a contract. The minimum performance bond requirements as set forth in BLM Manual 5451 are as follows:

1. A performance bond of not less than 20 percent of the total purchase price is required for all contracts of $2,500 or more.
2. A performance bond of not less than $500 is required for all installment contracts less than $2,500.
3. For cash sales under $2,500, the requirement of a performance bond is discretionary with the Authorized Officer.

The amount of the performance bond is expressed in both words and figures in Section 38(a). The general practice when computing the amount of the bond under 1. above, is to increase the computed figure to the next highest $100. For example, a bond computed to be $8,710.50 would be raised to $8,800.

It should be noted that the performance bond requirements set forth in BLM Manual 5451 are minimum requirements. The Authorized Officer may require bonds in greater amounts if such action is necessary to protect fully the interests of the Government.

Section 38(b) states the requirements for a performance bond increase if the purchaser elects to defer payment of the first installment. The increase must be in the amount of the first installment and written on the proper Bureau form and approved in writing by the Authorized Officer. Any one of the four types of bonds acceptable as a performance bond is proper. If a corporate surety is used, the increase bond rider form provides that the surety will pay the amount of the increase within 60 days after demand by the Authorized Officer if the purchaser fails to make the required payment. Refer to discussion under Section 3 concerning delayed payment of the first installment.

Section 38(c) states the requirements of a performance bond increase if the purchaser elects to cut timber, but not skid or yard to a loading point or remove from the contract area, before payment of the second or subsequent installments. The bond must be increased in amounts equal to one or more installments and must be approved in writing by the Authorized Officer prior to cutting any timber under the adjusted bond. Any one of the four types of bonds acceptable as a performance bond is proper. Bureau forms for bond increase riders should be used for this purpose.

When the purchaser increases his performance bond as described above, he does so in amounts equal to one or more installments as set forth in Section 3(b). This is a requirement established in 43 CFR 5451.2(b). For example, if a purchaser of a contract with installments set at $10,000 wishes to cut approximately $35,000 worth of timber in advance of payment, it will be necessary for him to increase his bond by an amount equal to four installments or $40,000.

There is no limit to the amount of performance bond increase which the purchaser may elect under Section 38(c). The purchaser can elect to cut 100 percent of the timber sold before skidding or yarding to a loading point or removal from the contract area by increasing the performance bond in installment increments sufficient to equal or exceed the total purchase price. Refer to discussion under Section 3 concerning deferred payment for cutting prior to skidding or yarding to a loading point or removal of timber from the contract area and concerning payment of the first installment.

Section 38(d) is concerned with several administrative matters involving the performance bond. This subsection permits the Authorized Officer to reduce the bond required by Section 38(a) when contract requirements are completed to the satisfaction of the Authorized Officer. The reduction, if any, is not automatic and must be requested by the purchaser. Further, no reduction below the minimum regulatory requirement is permitted until the total purchase price has been paid. Section 38(d) has a space provided where the amount of the minimum bond as required by regulation is entered. Here again, the amount of the bond entered in the space provided is expressed in both words and figures. The amount of the bond expressed in Section 38(a) and Section 38(d) will be the same when only a minimum bond is required of the purchaser.

Section 38(d) also provides that the Authorized Officer will determine damages in default situations and that the performance bond will be forfeited to such amount. Also, Section 38(d) stipulates that in the event the amount of the performance bond is inadequate to pay the damages determined by the Authorized Officer, the purchaser will pay the excess.

Finally, Section 38(d) provides that upon satisfactory performance of the contract, the bond shall be cancelled and any cash or negotiable securities deposited in lieu of a performance bond shall be returned to the purchaser.

Section 38(e) provides for use of a payment bond to guarantee payment for timber which the purchaser elects to either cut (payment not assured by cut-but-not-remove increased performance bond), cut and remove, or remove (timber already cut). Payment bonds must be in an amount equal to one or more installments and approved in writing by the Authorized Officer before cutting or removal of any timber covered by the payment bond. Section 38(e) does not stipulate minimum or maximum payment bond amounts as long as the bond is in the amount of one or more installments. Remember that the purchaser can use both the cut-but-not-remove increased performance bond and a payment bond on the same contract. For payment bonds to be most useful to the purchaser, the total amount of the bond should be sufficient to balance his planned rate of cutting and/or removal in relation to his anticipated rate of payments so that he can maintain a continuous operation. Otherwise, if cutting exceeds the value of the payment bond, the operation must be suspended pending receipt of proper installment payment in accordance with Section 3(b).

If timber cutting and skidding or yarding to a loading point or removal of timber from the contract area is to be accomplished as a continuous and nearly simultaneous operation, the amount of the payment bond should be at least twice the value of the timber to be cut in one month.

The blanket payment bond form provides the purchaser with the opportunity to place more than one of his contracts under the payment bond at one time in one District. Contracts may be added, by amendment, to the list on the bond form upon written application from the purchaser to the Authorized Officer and subsequent approval by the Authorized Officer together with written notification by him to the surety of such addition. The Authorized Officer must remove contracts from the list after written request from the purchaser and when security for payment under the bond is no longer needed for that particular contract.

When more than one contract is covered by a blanket payment bond, there is no actual allocation of the bond to each contract. However, the sum of the value of cutting prior to payment on all contracts covered under one bond cannot exceed the penal amount of the bond. For contract administration purposes, a contract should not be added to a blanket payment bond until the purchaser's rate of cutting and removal can be predicted with reasonable accuracy. This can best be done just before operations begin or when the purchaser's logging plan is submitted for review and approval. Contracts may be added to the bond at any time during the life of the contract.

Payments secured under the payment bond also include related road maintenance fees.

The blanket payment bond form also contains specific provisions, in terms of timing, for cancellation of the bond, except for the liabilities which precede the effective date of the cancellation.

Section 39: Time for Removal of Personal Property

Section 39 specifies the time limits within which the purchaser must remove his personal property from the contract area. This time commences with the expiration of the time for cutting and removal of timber as expressed in Section 4 of the contract and continues for a specified period of time. The period, expressed in months, is entered in the blank provided in the section. By policy, the minimum time allowed for removal of personal property is 1 month and the maximum period is 12 months. As is the case with the amount of time permitted for cutting and removal of timber sold under the contract, the Authorized Officer sets the limits for removal of personal property based upon the circumstances of the particular contract. Section 39 provides that the Authorized Officer may grant up to 3 additional months for removal of personal property when deemed appropriate to do so.

Personal property is defined in Section 39 as "equipment, improvements, or other personal property." Logs are not personal property within the meaning of this contract and may not be removed during this period. Road surfacing, culverts, bridges, etc., which the purchaser places on the contract area and which becomes a permanent part of the property are not considered personal property. Logging equipment, portable sawmills, and sanitary facilities are examples of personal property.

Section 39 provides that equipment, improvements, or other personal property remaining on the contract area at the expiration of the period for removal or extension thereof, become the property of the Government.

Refuse remaining on the contract area following the expiration of the time for removal of personal property comes within the provisions of Section 26.

Section 40: Timber Reserved From Cutting

Section 1 of the contract specifies that the Government sells to the purchaser and the purchaser buys from the Government all timber on the contract area except that timber which is reserved by the Government under Section 40. Timber to be reserved from cutting and retained as the property of the Government must be adequately and properly described in the space provided in Section 40. The importance of this provision can be well understood when it is realized that the purchaser may cut and remove any and all timber on the contract area which is not otherwise reserved by the Government. On the other hand, timber which has been sold and is intended to be cut should not be inadvertently reserved in Section 40.

Timber reservation stipulations to cover varying field conditions are listed in Appendix 3. Foresters must accurately translate field conditions (markings or reservations) using appropriate contract language and map symbols.

Section 41: Special Provisions

Special provisions of the contract which are needed for a particular purpose are set forth in Section 41. Special provisions should be included to lend clarity and detail when the standard provisions (Sections 1 through 40) will not properly cover the situation. Special provisions which contradict the standard provisions should not be included in the contract.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Form 5450-3 has been developed over a period of years, utilizing the best experience and knowledge of Bureau personnel. It is a balanced instrument suitable for use at the District level by foresters. The contract form has been developed so that each contract made and entered into does not require legal review prior to execution. In the choice of special provisions, it is important not to upset the balance of the contract and thereby destroy the utility of the form.

State Directors are encouraged to develop uniform language for special provisions for use by Districts. In this respect a State Director should work in cooperation with the Regional or Field Solicitor to assure that special provisions thus developed are in accord with the basic contract document. New special provisions proposed by a District must receive and approval by the State Director prior to use in a contract.

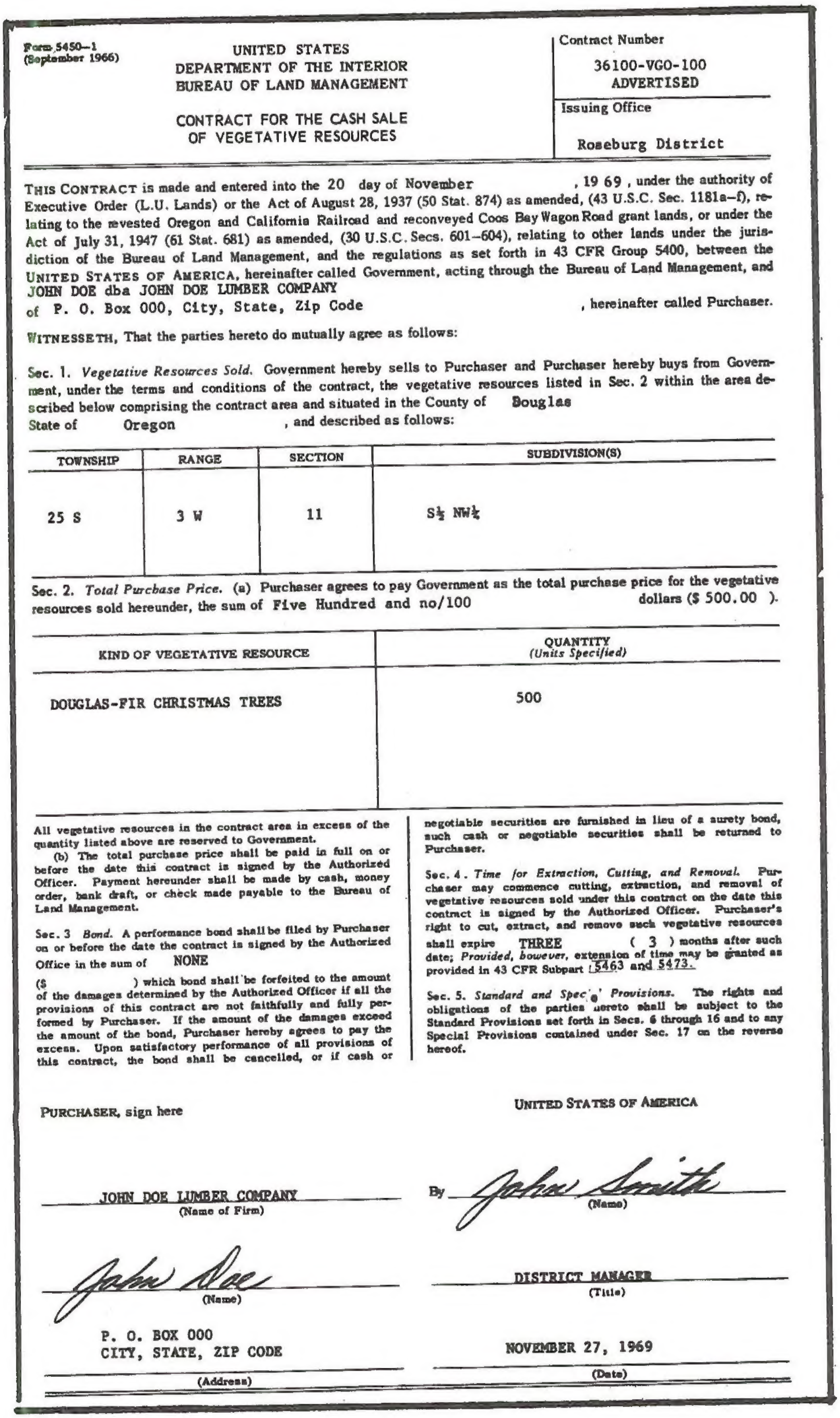
Execution of the Contract

The successful bidder, on auction sales, must sign and return the contract within 30 days after receiving it, together with the bonds and payment as required, unless an extension of time is allowed.

Commitment to the terms and conditions of the contract is complete upon submission of the required bond and payment by the purchaser and signature by the purchaser and the Authorized Officer.

(Refer to BLM Manual 5454, Execution of Contract, regarding actions to be taken by the Authorized Officer before signing the contract.)

Contract For The Cash Sale Of Vegetative Resources



Form 5450-1
(September 1966)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CONTRACT FOR THE CASH SALE
OF VEGETATIVE RESOURCES

Contract Number
36100-VGO-100
ADVERTISED

Issuing Office
Roseburg District

THIS CONTRACT is made and entered into the 20 day of November, 19 69, under the authority of Executive Order (L.U. Lands) or the Act of August 28, 1937 (50 Stat. 874) as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947 (61 Stat. 681) as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the UNITED STATES OF AMERICA, hereinafter called Government, acting through the Bureau of Land Management, and JOHN DOE dba JOHN DOE LUMBER COMPANY of P. O. Box 000, City, State, Zip Code, hereinafter called Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Vegetative Resources Sold.* Government hereby sells to Purchaser and Purchaser hereby buys from Government, under the terms and conditions of the contract, the vegetative resources listed in Sec. 2 within the area described below comprising the contract area and situated in the County of Douglas State of Oregon, and described as follows:

TOWNSHIP	RANGE	SECTION	SUBDIVISION(S)
25 S	3 W	11	S½ NW¼

Sec. 2. *Total Purchase Price.* (a) Purchaser agrees to pay Government as the total purchase price for the vegetative resources sold hereunder, the sum of Five Hundred and no/100 dollars ($ 500.00).

KIND OF VEGETATIVE RESOURCE	QUANTITY *(Units Specified)*
DOUGLAS-FIR CHRISTMAS TREES	500

All vegetative resources in the contract area in excess of the quantity listed above are reserved to Government.

(b) The total purchase price shall be paid in full on or before the date this contract is signed by the Authorized Officer. Payment hereunder shall be made by cash, money order, bank draft, or check made payable to the Bureau of Land Management.

Sec. 3 *Bond.* A performance bond shall be filed by Purchaser on or before the date the contract is signed by the Authorized Office in the sum of NONE ($) which bond shall be forfeited to the amount of the damages determined by the Authorized Officer if all the provisions of this contract are not faithfully and fully performed by Purchaser. If the amount of the damages exceed the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled, or if cash or negotiable securities are furnished in lieu of a surety bond, such cash or negotiable securities shall be returned to Purchaser.

Sec. 4. *Time for Extraction, Cutting, and Removal.* Purchaser may commence cutting, extraction, and removal of vegetative resources sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut, extract, and remove such vegetative resources shall expire THREE (3) months after such date; *Provided, however,* extension of time may be granted as provided in 43 CFR Subpart 5463 and 5473.

Sec. 5. *Standard and Special Provisions.* The rights and obligations of the parties hereto shall be subject to the Standard Provisions set forth in Secs. 6 through 16 and to any Special Provisions contained under Sec. 17 on the reverse hereof.

PURCHASER, sign here

JOHN DOE LUMBER COMPANY
(Name of Firm)

John Doe
(Name)

P. O. BOX 000
CITY, STATE, ZIP CODE
(Address)

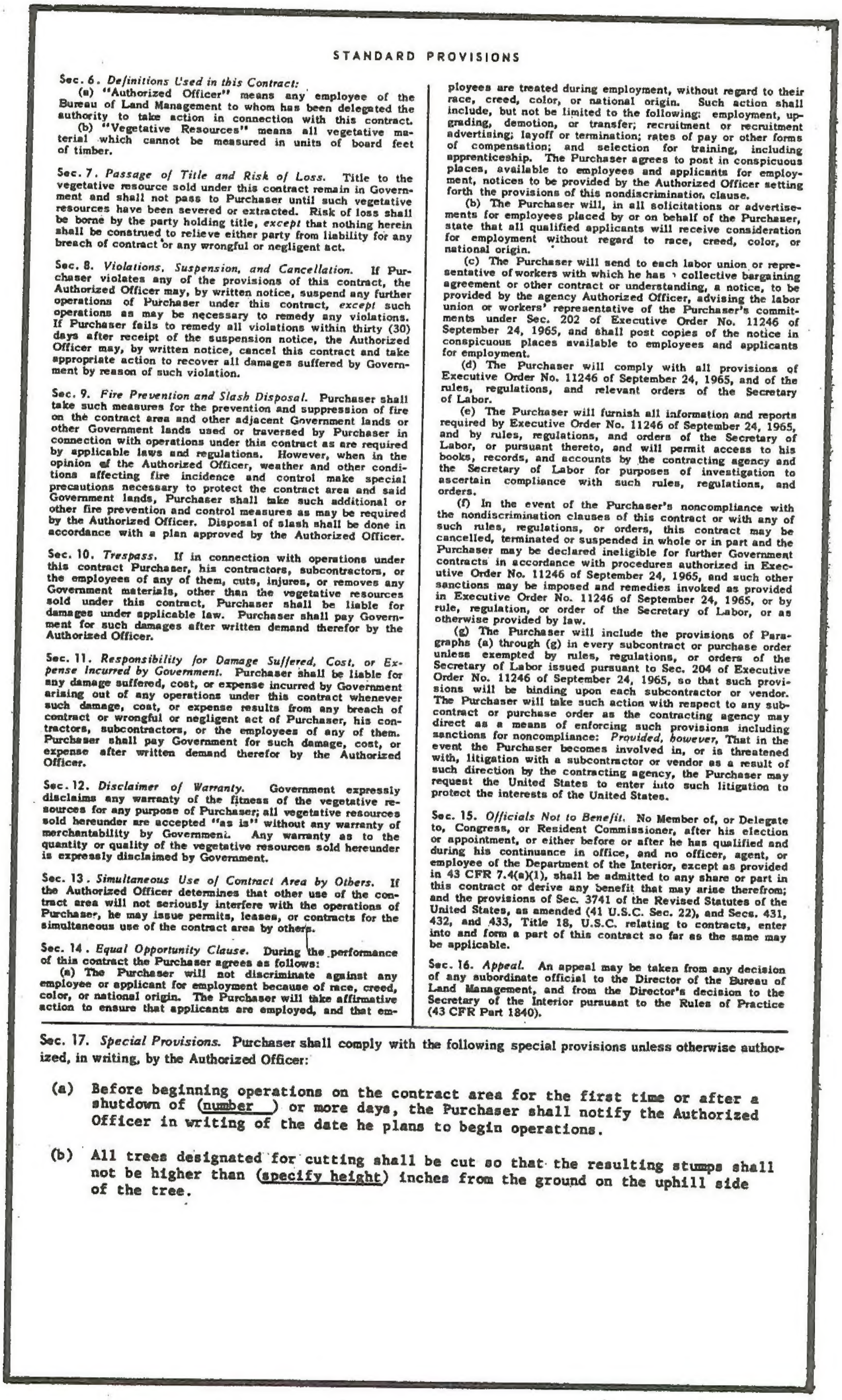
UNITED STATES OF AMERICA

By John Smith
(Name)

DISTRICT MANAGER
(Title)

NOVEMBER 27, 1969
(Date)

Contract For The Cash Sale Of Vegetative Resources



STANDARD PROVISIONS

Sec. 6. *Definitions Used in this Contract:*

(a) "Authorized Officer" means any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) "Vegetative Resources" means all vegetative material which cannot be measured in units of board feet of timber.

Sec. 7. *Passage of Title and Risk of Loss.* Title to the vegetative resource sold under this contract remain in Government and shall not pass to Purchaser until such vegetative resources have been severed or extracted. Risk of loss shall be borne by the party holding title, *except* that nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act.

Sec. 8. *Violations, Suspension, and Cancellation.* If Purchaser violates any of the provisions of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, *except* such operations as may be necessary to remedy any violations. If Purchaser fails to remedy all violations within thirty (30) days after receipt of the suspension notice, the Authorized Officer may, by written notice, cancel this contract and take appropriate action to recover all damages suffered by Government by reason of such violation.

Sec. 9. *Fire Prevention and Slash Disposal.* Purchaser shall take such measures for the prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations under this contract as are required by applicable laws and regulations. However, when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 10. *Trespass.* If in connection with operations under this contract Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government materials, other than the vegetative resources sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 11. *Responsibility for Damage Suffered, Cost, or Expense Incurred by Government.* Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 12. *Disclaimer of Warranty.* Government expressly disclaims any warranty of the fitness of the vegetative resources for any purpose of Purchaser; all vegetative resources sold hereunder are accepted "as is" without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the vegetative resources sold hereunder is expressly disclaimed by Government.

Sec. 13. *Simultaneous Use of Contract Area by Others.* If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 14. *Equal Opportunity Clause.* During the performance of this contract the Purchaser agrees as follows:

(a) The Purchaser will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Authorized Officer setting forth the provisions of this nondiscrimination clause.

(b) The Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of the Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(c) The Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency Authorized Officer, advising the labor union or workers' representative of the Purchaser's commitments under Sec. 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Purchaser's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Purchaser will include the provisions of Paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Sec. 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Purchaser will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however,* That in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 15. *Officials Not to Benefit.* No Member of, or Delegate to, Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4(a)(1), shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom; and the provisions of Sec. 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Secs. 431, 432, and 433, Title 18, U.S.C. relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 16. *Appeal.* An appeal may be taken from any decision of any subordinate official to the Director of the Bureau of Land Management, and from the Director's decision to the Secretary of the Interior pursuant to the Rules of Practice (43 CFR Part 1840).

Sec. 17. *Special Provisions.* Purchaser shall comply with the following special provisions unless otherwise authorized, in writing, by the Authorized Officer:

(a) Before beginning operations on the contract area for the first time or after a shutdown of (number) or more days, the Purchaser shall notify the Authorized Officer in writing of the date he plans to begin operations.

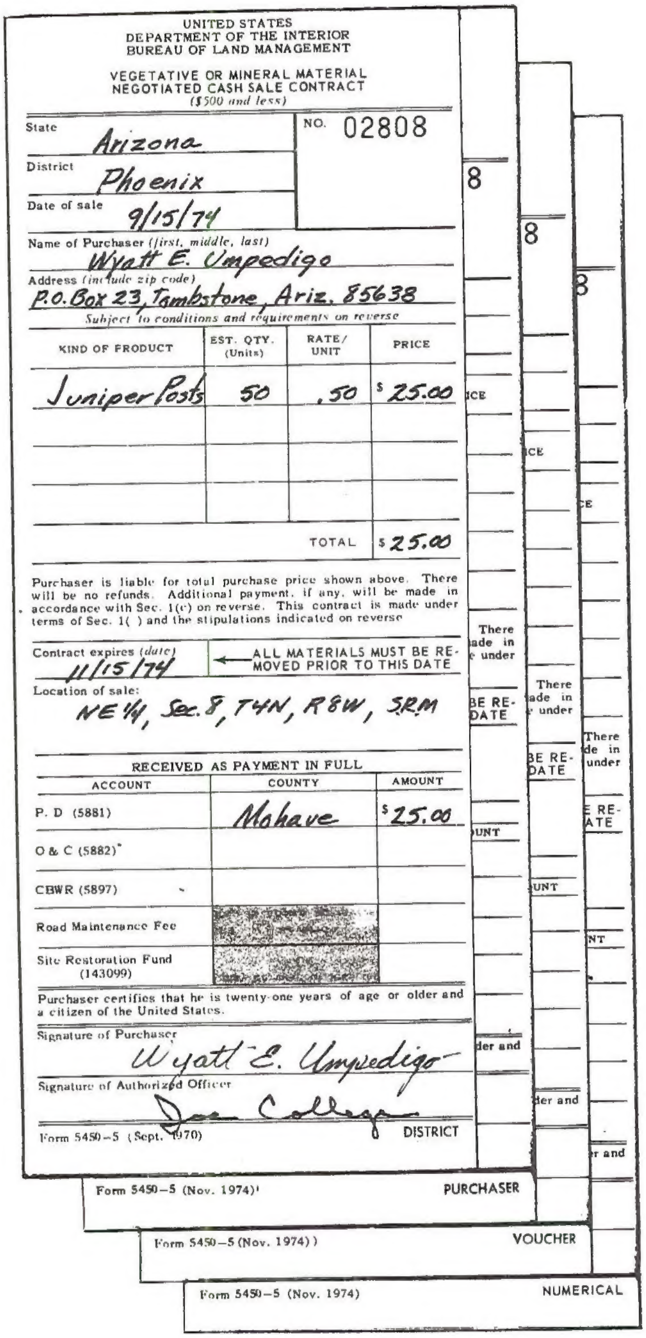
(b) All trees designated for cutting shall be cut so that the resulting stumps shall not be higher than (specify height) inches from the ground on the uphill side of the tree.

Illustration 4
Form 5450-5
(.41)

Vegetative or Mineral Material Negotiated Cash Sale Contract

($500 and less)

(Front Side)



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VEGETATIVE OR MINERAL MATERIAL
NEGOTIATED CASH SALE CONTRACT
($500 and less)

State *Arizona*
NO. 02808
District *Phoenix*
Date of sale *9/15/74*
Name of Purchaser *(first, middle, last)* *Wyatt E. Umpedigo*
Address *(include zip code)* *P.O. Box 23, Tombstone, Ariz. 85638*

Subject to conditions and requirements on reverse

KIND OF PRODUCT	EST. QTY. (Units)	RATE/ UNIT	PRICE
Juniper Posts	*50*	*.50*	$ *25.00*
		TOTAL	$ *25.00*

Purchaser is liable for total purchase price shown above. There will be no refunds. Additional payment, if any, will be made in accordance with Sec. 1(c) on reverse. This contract is made under terms of Sec. 1( ) and the stipulations indicated on reverse

Contract expires *(date)* *11/15/74* ← ALL MATERIALS MUST BE REMOVED PRIOR TO THIS DATE

Location of sale: *NE 1/4, Sec. 8, T4N, R8W, SRM*

RECEIVED AS PAYMENT IN FULL

ACCOUNT	COUNTY	AMOUNT
P. D (5881)	*Mohave*	$ *25.00*
O & C (5882)*		
CBWR (5897)		
Road Maintenance Fee	▨	
Site Restoration Fund (143099)	▨	

Purchaser certifies that he is twenty-one years of age or older and a citizen of the United States.

Signature of Purchaser *Wyatt E. Umpedigo*

Signature of Authorized Officer *Joe College*

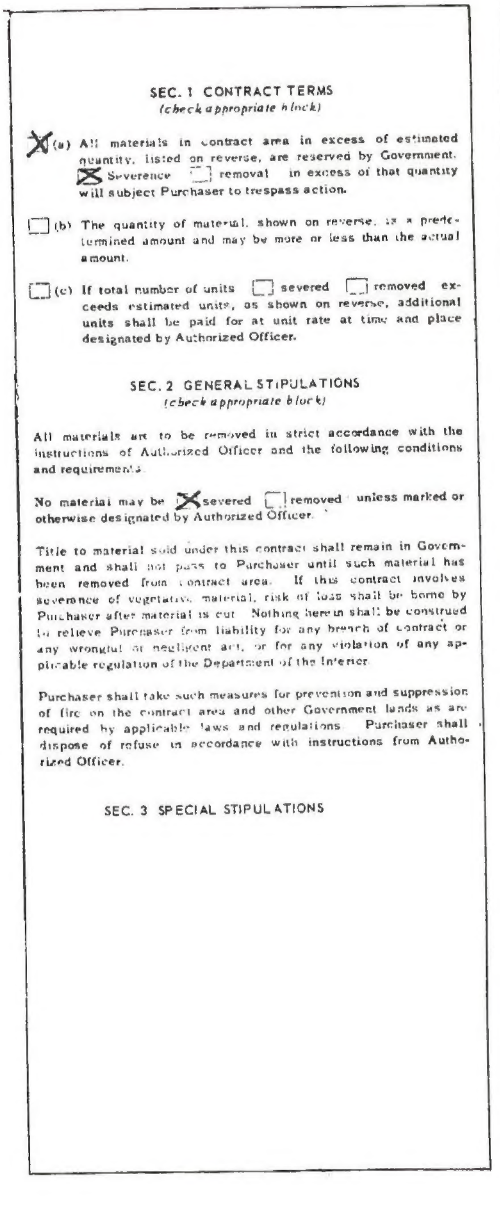
Form 5450–5 (Sept. 1970) DISTRICT

Form 5450–5 (Nov. 1974) PURCHASER

Form 5450–5 (Nov. 1974) VOUCHER

Form 5450–5 (Nov. 1974) NUMERICAL

(Reverse Side)



SEC. 1 CONTRACT TERMS
(check appropriate block)

☒ (a) All materials in contract area in excess of estimated quantity, listed on reverse, are reserved by Government. ☒ Severence ☐ removal in excess of that quantity will subject Purchaser to trespass action.

☐ (b) The quantity of material, shown on reverse, is a predetermined amount and may be more or less than the actual amount.

☐ (c) If total number of units ☐ severed ☐ removed exceeds estimated units, as shown on reverse, additional units shall be paid for at unit rate at time and place designated by Authorized Officer.

SEC. 2 GENERAL STIPULATIONS
(check appropriate block)

All materials are to be removed in strict accordance with the instructions of Authorized Officer and the following conditions and requirements.

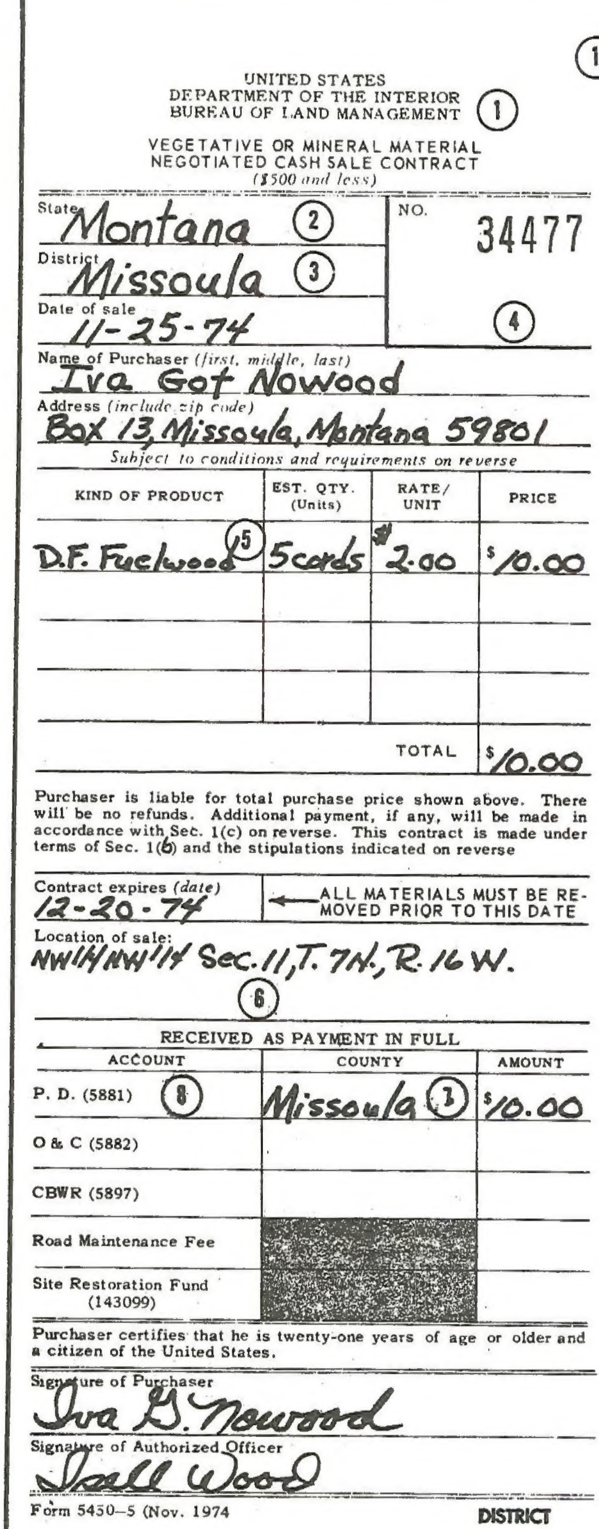
No material may be ☒ severed ☐ removed unless marked or otherwise designated by Authorized Officer.

Title to material sold under this contract shall remain in Government and shall not pass to Purchaser until such material has been removed from contract area. If this contract involves severance of vegetative material, risk of loss shall be borne by Purchaser after material is cut. Nothing herein shall be construed to relieve Purchaser from liability for any breach of contract or any wrongful or negligent act, or for any violation of any applicable regulation of the Department of the Interior.

Purchaser shall take such measures for prevention and suppression of fire on the contract area and other Government lands as are required by applicable laws and regulations. Purchaser shall dispose of refuse in accordance with instructions from Authorized Officer.

SEC. 3 SPECIAL STIPULATIONS

Reporting Vegetative or Mineral Material Negotiated Cash Sale ($500 and less)



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT ①

VEGETATIVE OR MINERAL MATERIAL
NEGOTIATED CASH SALE CONTRACT
($500 and less)

State Montana ②

NO. 34477

District Missoula ③

Date of sale 11-25-74

④

Name of Purchaser *(first, middle, last)* Iva Got Nowood

Address *(include zip code)* Box 13, Missoula, Montana 59801

Subject to conditions and requirements on reverse

KIND OF PRODUCT	EST. QTY. (Units)	RATE/ UNIT	PRICE
D.F. Fuelwood ⑤	5 cords	$2.00	$10.00
		TOTAL	$10.00

Purchaser is liable for total purchase price shown above. There will be no refunds. Additional payment, if any, will be made in accordance with Sec. 1(c) on reverse. This contract is made under terms of Sec. 1(b) and the stipulations indicated on reverse

Contract expires *(date)* 12-20-74 ←ALL MATERIALS MUST BE REMOVED PRIOR TO THIS DATE

Location of sale: NW1/4 NW1/4 Sec. 11, T. 7N., R. 16 W. ⑥

RECEIVED AS PAYMENT IN FULL

ACCOUNT	COUNTY	AMOUNT
P. D. (5881) ⑧	Missoula ⑦	$10.00
O & C (5882)		
CBWR (5897)		
Road Maintenance Fee		
Site Restoration Fund (143099)		

Purchaser certifies that he is twenty-one years of age or older and a citizen of the United States.

Signature of Purchaser Iva G. Nowood

Signature of Authorized Officer Isall Wood

Form 5450-5 (Nov. 1974

DISTRICT

Reporting Instructions

① (Use ADP Codes - BLM Manual 1265, Appendix 1)

Reproduce the District copy of Form 5450-5 (by Xerox or equivalent). Enter the ADP codes in red on the reproduction for the data elements indicated below.

Submit the reproduced copy for each contract to the Denver Service Center, Division of Data Processing (200) within 5 days after the end of the month.

② Record State Code - Alpha Code

③ Record District Code - 2 numeric digits

④ Record District ADP Control Number - 1 to 4 numeric digits

⑤ Record Product Code - 2 numeric digits

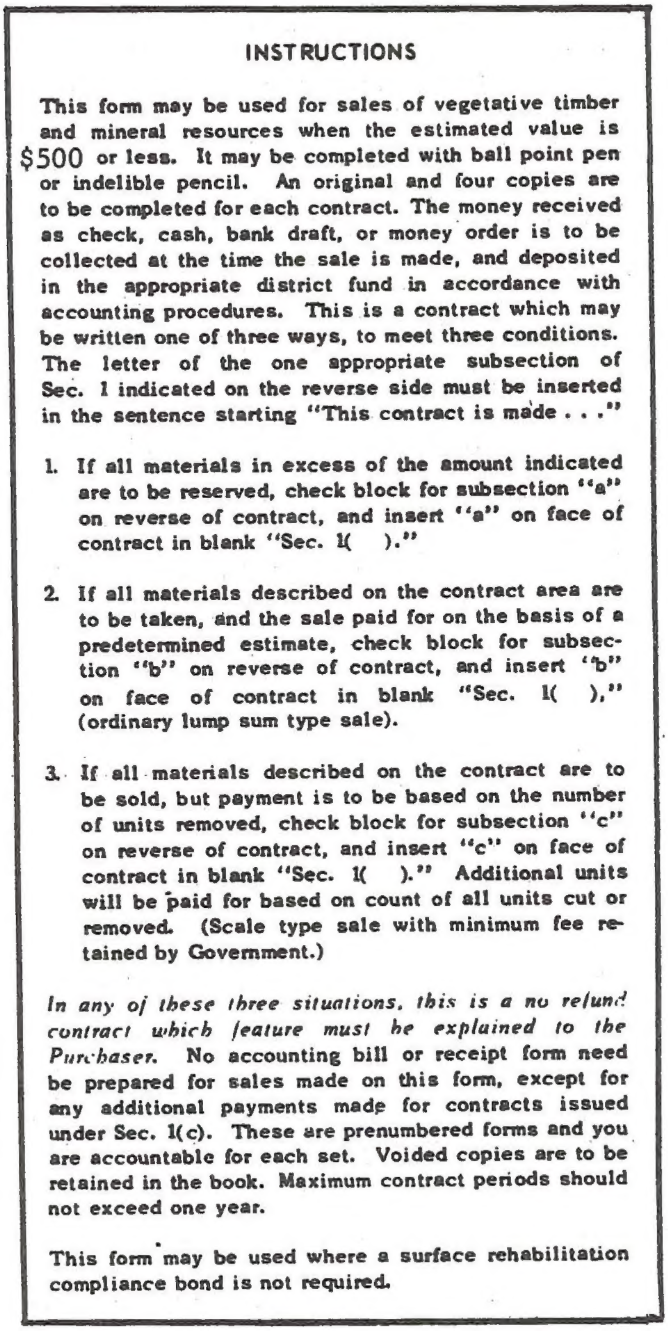
⑥ Record Planning Unit Code - 2 numeric digits
(Western Oregon record Master Unit - TMA Code - 3 numeric digits)

⑦ Record County Code - 3 numeric digits

⑧ Record Land Ownership Status Code 1 numeric digit

Reporting Vegetative or Mineral Material Negotiated

Cash Sale Contract ($500 and less)



INSTRUCTIONS

This form may be used for sales of vegetative timber and mineral resources when the estimated value is $500 or less. It may be completed with ball point pen or indelible pencil. An original and four copies are to be completed for each contract. The money received as check, cash, bank draft, or money order is to be collected at the time the sale is made, and deposited in the appropriate district fund in accordance with accounting procedures. This is a contract which may be written one of three ways, to meet three conditions. The letter of the one appropriate subsection of Sec. 1 indicated on the reverse side must be inserted in the sentence starting "This contract is made . . ."

1. If all materials in excess of the amount indicated are to be reserved, check block for subsection "a" on reverse of contract, and insert "a" on face of contract in blank "Sec. 1( )."
2. If all materials described on the contract area are to be taken, and the sale paid for on the basis of a predetermined estimate, check block for subsection "b" on reverse of contract, and insert "b" on face of contract in blank "Sec. 1( )," (ordinary lump sum type sale).
3. If all materials described on the contract are to be sold, but payment is to be based on the number of units removed, check block for subsection "c" on reverse of contract, and insert "c" on face of contract in blank "Sec. 1( )." Additional units will be paid for based on count of all units cut or removed. (Scale type sale with minimum fee retained by Government.)

In any of these three situations, this is a no refund contract which feature must be explained to the Purchaser. No accounting bill or receipt form need be prepared for sales made on this form, except for any additional payments made for contracts issued under Sec. 1(c). These are prenumbered forms and you are accountable for each set. Voided copies are to be retained in the book. Maximum contract periods should not exceed one year.

This form may be used where a surface rehabilitation compliance bond is not required.

Form 5420-2
(October 1970)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

TIMBER SALE SUMMARY

INSTRUCTIONS

1. Forester responsible for contract preparation will complete all appropriate entries in pencil.
2. Attach to front cover of contract file.
3. When *Timber Sale Contract* is signed by purchaser, district clerk will enter name and address of purchaser, contract number, and bid values.
4. After contract is approved by Authorized Officer, remove form from front cover and file with contract.

Sale Name: ONION MEADOW
Date: September 12, 1973
District Sale Number: 74-31
Contract Number: 36090-TS4-56
Purchaser: Standard Studs
Address (include zip code): EUGENE, OREGON 97401

PURCHASER CLASS: ☑ Small ☐ Large ☐ Public

Organizational Unit: EUGENE District
State: OREGON
County: LANE
Sustained Yield Area: Siuslaw Master Unit

☐ O&C ☐ CBWR ☐ PD

☐ Individual ☐ Partnership ☑ Corporation

SECTION	TOWNSHIP	RANGE	SUBDIVISION
21	20 S.	4 W.	E 1/2 NE 1/4, SE 1/4
13	20 S.	4 W.	SW 1/4

SUBDIVISIONS OR CUTTING AREAS	CUTTING VOLUME BY SPECIES MBF						TOTAL CUTTING VOLUME	CUTTING AREA ACRES	
	D.F.	W.H.	W.R.C.					CLEAR	PARTIAL
R/W in Sec. 13	165	10	5				180	4	
AREA #1	1,745	123					1,868	50	2
AREA #2	1,432	68	2				1,502	31	3
TOTALS	3,342	201	7				3,550	85	5

TYPE OF SALE: REG. ADV. (Sept.)
Time for cutting and removal (month) 36
Time for remov. personal prop. (month) 1
Amount of security required $

PAYMENTS
First Installment $10,000.00
Less Deposit $31,000.00
Balance First Installment $ ———

Was road qualified for SBA construction loan? ☐ Yes ☑ No

VOLUME MBF	
Green	3,200
Salvage	350
Sawlog	3,000
Peeler	550
~~Chargeable~~ (REGULATED)	3,500
~~Nonchargeable~~ (NON-REGULATED)	50
Clearcut Vol./Acre	41
Partial Cut Vol./Acre	20

LOGGING COSTS PER MBF	
Falling and Bucking $	1.41
Yard, Load, etc.	4.90
Road Construction	5.85
Transportation	3.62
Amortization	1.10
Maintenance	.85
Other Allowances	.70
TOTAL $	18.43

APPRAISAL ELEMENTS

MERCHANTABLE TREES (No.)	SPECIES	VOLUME MBF	APPRAISED VALUE		BID VALUE	
			UNIT*	TOTAL	UNIT	TOTAL
641	Douglas fir	3,342	$90.40	$302,116.80	$102.00	$340,884.00
251	Western Hemlock	201	42.10	8,462.10	42.10	8,462.10
6	Western Red Cedar	7	36.00	252.00	36.10	252.00
TOTAL		3,550 MBF		310,830.90		349,598.10

* Nearest 5¢

Section Diagram

EXHIBIT A PAGE 1 OF 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SECTION DIAGRAM

Contract Number 36110-TS3-40

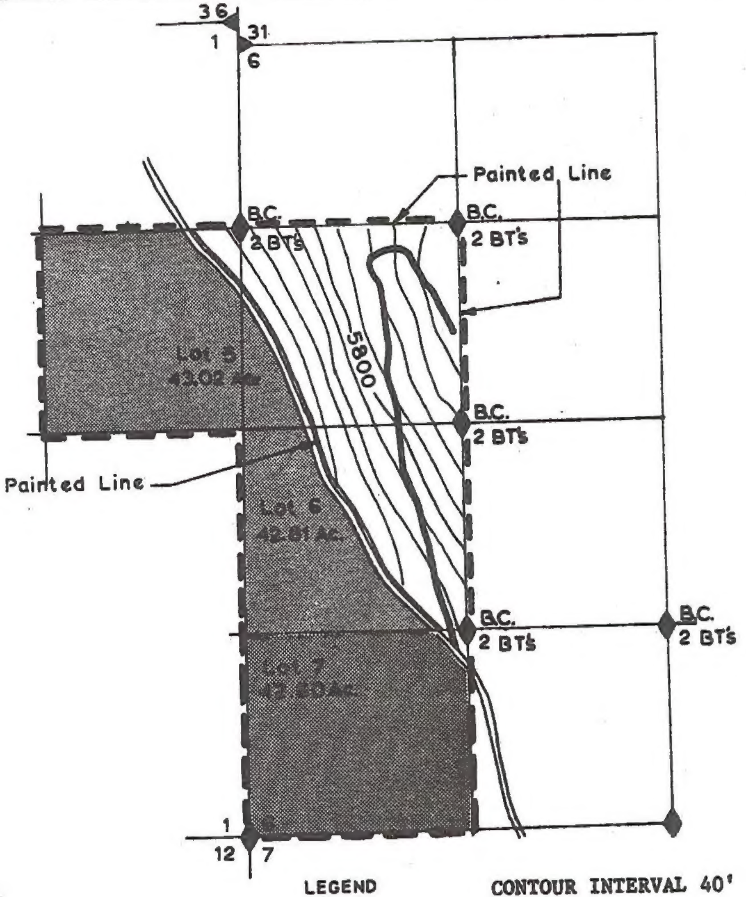
Map SUMMIT ROCK SALVAGE TIMBER SALE

Township	Range	Section	Meridian
39 S. 39 S.	5 E. 6 E.	1 6	WILL. MER.

District MEDFORD

Mapper

Date JANUARY 1, 1973



SCALE: 1" = 1,000 FT.

LEGEND

CONTOUR INTERVAL 40'

☐	Approx. Area In Which Individual Trees Are Marked For Cutting	61.00 Ac.	
☐			
▨	Approx. Area In Which No Trees Are Marked For Cutting	64.83 Ac.	
☐			
	TOTAL CONTRACT AREA:	125.83 Ac.	

═ Existing Road

▬ Road To Be Constructed

▬ ▬ Boundary Of Contract Area

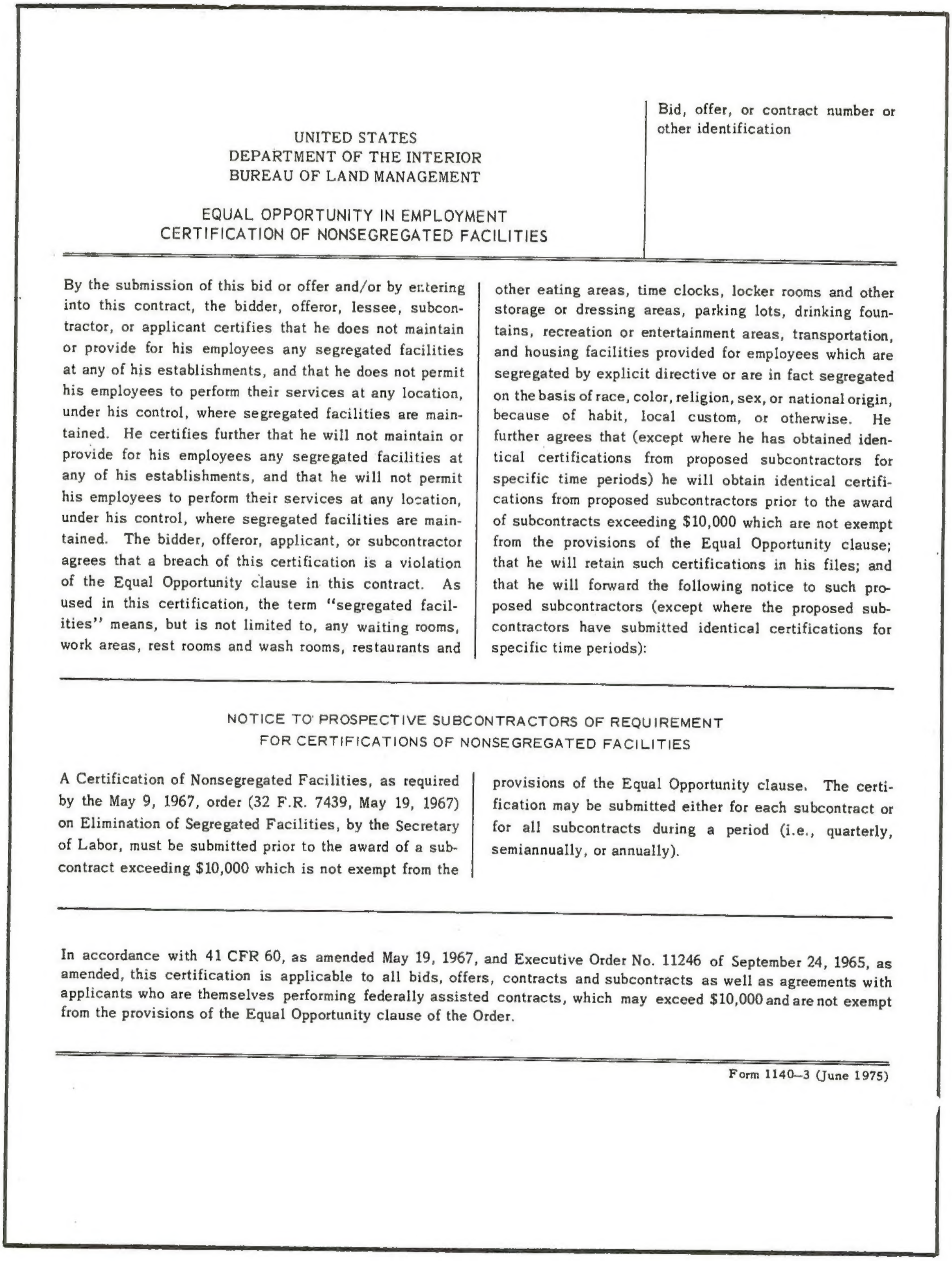
— Boundary Of Cutting Area

◆ Found Corners

Form 5400-1 (May 1971)

Equal Opportunity in Employment

Certificate of Nonsegregated Facilities



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EQUAL OPPORTUNITY IN EMPLOYMENT CERTIFICATION OF NONSEGREGATED FACILITIES

Bid, offer, or contract number or other identification

By the submission of this bid or offer and/or by entering into this contract, the bidder, offeror, lessee, subcontractor, or applicant certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means, but is not limited to, any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

In accordance with 41 CFR 60, as amended May 19, 1967, and Executive Order No. 11246 of September 24, 1965, as amended, this certification is applicable to all bids, offers, contracts and subcontracts as well as agreements with applicants who are themselves performing federally assisted contracts, which may exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause of the Order.

Form 1140–3 (June 1975)

Log Export Special Stipulations LE-1

(For use with all sales except those containing Port Orford cedar.)

All timber sold to the Purchaser under the terms of this contract is restricted from export from the United States in the form of unprocessed timber. For the purpose of this contract, unprocessed timber is defined as (1) any logs, such as sawlogs, peeler logs, and pulp logs; (2) cants or squares to be subsequently remanufactured exceeding a nominal eight (8) inches in thickness; or (3) split or round bolts or other roundwood not processed to standards and specifications suitable for end product use. Thus, timber manufactured into the following will be considered processed: (1) lumber and construction timbers, regardless of size, manufactured to standards and specifications suitable for end product uses; (2) chips, pulp and pulp products; (3) green or dry veneer and plywood; (4) poles and piling cut or treated for use as such; (5) cants, squares, and lumber cut for remanufacturing of a nominal eight (8) inches in thickness or less.

In the event the Purchaser elects to sell any or all of the timber sold under this contract in the form of unprocessed timber, the Purchaser shall require each party buying, exchanging, or receiving such timber to execute a "Certificate as to Domestic Processing of Timber." The original of such certification shall be filed with the Authorized Officer.

Prior to the termination of this contract, the Purchaser shall submit to the Authorized Officer a "Certificate of Disposition of Timber Sale Volume" which shall be executed by the Purchaser. In addition, the Purchaser is required under the terms of this contract to retain for a three-year period from the date of termination of the contract the records of all sales or transfer of logs involving timber from the sale for inspection and use of the Bureau of Land Management.

Unless otherwise authorized in writing by the Authorized Officer, the Purchaser shall, prior to the removal of timber from the contract area, brand with the Purchaser's registered log brand at least one end of each log bolt or other roundwood and indentify each of these by painting with highway yellow paint.

In the event of the Purchaser's noncompliance with this subsection of the contract, the Authorized Officer may take appropriate action as set forth in Section 10 of this contract. In addition, the Purchaser may be declared ineligible to receive future awards of Government timber for a period of one year.

Log Export Special Stipulations LE-2

(For use with sales containing Port Orford cedar)

Except _________ M board feet (Scribner Decimal C 16 Foot Log Rule) of Port Orford cedar, all other timber sold the Purchaser under the terms of this contract is restricted from export from the United States in the form of unprocessed timber. For the purpose of this contract, unprocessed timber is defined as (1) any logs, such as sawlogs, peeler logs and pulp logs; (2) cants or squares to be subsequently remanufactured exceeding a nominal eight (8) inches in thickness; or (3) split or round bolts or other roundwood not processed to standards and specifications suitable for end product use. Thus, timber manufactured into the following will be considered processed: (1) lumber and construction timbers, regardless of size, manufactured to standards and specifications suitable for end product uses; (2) chips, pulp and pulp products; (3) green or dry veneer and plywood; (4) poles and piling cut or treated for use as such; (5) cants, squares, and lumber cut for remanufacture of nominal eight (8) inches in thickness or less.

In the event the Purchaser elects to sell any or all of the non-excepted timber sold under this contract in the form of unprocessed timber, the Purchaser shall require each party buying, exchanging or receiving such timber to execute a "Certificate as to Domestic Processing of Timber." The original of such certification shall be filed with the Authorized Officer.

In the event the Purchaser elects to export or to sell for export purposes any or all of the timber exempted from the restrictions on export, he shall file with the Authorized Officer a "Notice of Removal of Exempted Timber for Export Purposes" at least ten days prior to the removal of such exempted timber from the contract area.

Prior to the termination of this contract, the Purchaser shall submit to the Authorized Officer a "Certificate of Disposition of Timber Sale Volume" which shall be executed by the Purchaser. In addition, the Purchaser is required under the terms of this contract to retain for a three-year period from the date of termination of the contract, the records of all sales or transfer of logs involving timber from the sale for the inspection and use of the Bureau of Land Management.

Unless otherwise authorized in writing by the Authorized Officer, the Purchaser shall comply with the following requirements prior to the removal of timber from the contract area.

(1) Unprocessed timber restricted from export. Brand with the Purchaser's registered log brand at least one end of each log, bolt or other roundwood and identify each of these by painting with highway yellow paint.

(2) Timber excepted from export restrictions. Brand with Purchaser's registered log brand, different from that used on restricted timber, at least one end of each log, bolt or other roundwood and segregate excepted logs restricted from export at locations on or adjacent to the contract area; furthermore, such excepted logs shall not be painted with highway yellow paint.

In the event of the Purchaser's non-compliance with the subsection of the contract, the Authorized Officer may take appropriate action as set forth in Section 10 of this contract. In addition, the Purchaser may be declared ineligible to receive future awards of Government timber for a period of one year.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Timber Reservation Provisions

The timber reserve provisions presented here have been developed and approved for use with Form 5450-3, Contract For The Sale Of Timber (Lump-Sum Sale). The provisions relate to area reservations (AR-) and to individual tree reservations (IR-). The provisions are to be used as written with insertion of appropriate language within the parenthetical enclosures. Situations which require timber reserve clauses other than those presented herein must be approved by the State Director prior to use.

PROVISION	INSTRUCTIONS	EXAMPLE
AR-1 All timber on the reserve area(s) shown on Exhibit A and all (described how boundary trees are marked) trees which are on or mark the boundaries of the reserve area(s).	Use AR-1 to reserve from cutting all timber on a designated area or areas.	All timber on the reserve area shown on Exhibit A and all blazed, painted, or posted trees which are on or mark the boundaries of the reserve area.
AR-2 All timber on the reserve area(s) shown on Exhibit A and all (blazed, painted, or posted) trees which are on or mark the boundaries of the reserve area(s), except approximately (specify number of trees by kind or species) marked for cutting heretofore by the Government with (describe how trees are marked) in (give location) shown on Exhibit A.	Use AR-2 to permit the cutting of marked trees in an area where trees are otherwise reserved from cutting.	All timber on the reserve areas shown on Exhibit A and all blazed, painted, or posted trees which are on or mark the boundaries of the reserve areas, except approximately one hundred twenty-four (124) Douglas-fir trees marked for cutting heretofore by the Government with red paint above and below stump height in the reserve areas shown on Exhibit A.
IR-1 Approximately (specify number of trees by species or kind) trees marked with (describe how trees are marked) in (give location) as on Exhibit A.	IR-1 is used when the trees to be reserved from cutting are individually marked, as in the case of seed trees. Unmarked trees may be cut. The general area to which the reservation applies must be shown on the contract map and be identifiable in the field.	Approximately one hundred fifty (150) Douglas-fir trees and fifty (50) western redcedar trees marked with white paint and aluminum tags in the partial cut area shown on Exhibit A.
IR-2 IR-2 All timber except approximately (specify number by kind or species) trees marked for cutting heretofore by the Government, with (describe how trees are marked) in (give location) shown on Exhibit A.	IR-2 is used to reserve all unmarked trees on a cutting area. Only marked trees may be cut. The general area to which the reservation applies must be shown on the contract map and be identifiable in the field.	All timber except approximately one hundred fifty (150) Douglas-fir, forty-seven (47) western hemlock and thirty-seven (37) western redcedar marked for cutting heretofore by the Government with red paint above and below stump height in partial cut area shown on Exhibit A.

Timber Reservation Provisions

PROVISION	INSTRUCTIONS	EXAMPLES
IR-3 All (identify species) trees which are smaller than (specify diameter) inches D.B.H.O.B. in (give location) shown on Exhibit A.	IR-3 is a reservation based upon diameter limit. All trees, by species if desired, which measure less than that specified in the provision are reserved to the Government. Trees exceeding the minimum diameter may be cut. The general area to which the provision applies must be shown on the contract map and be identifiable in the field.	All lodgepole pine trees which are smaller than eleven (11) inches D.B.H.O.B. in the cutting area shown on Exhibit A.
IR-4 All (identify species) trees which are smaller than (specify diameter) inches D.B.H.O.B., except approximately (specify number) trees thereof marked for cutting heretofore by the Government with (describe how trees are marked) in (give location) shown on Exhibit A.	IR-4 is a reservation based upon diameter limits similar to IR-3. However, IR-4 does permit the cutting of trees otherwise reserved when such trees have been marked for cutting. The general area to which this provision applies must be shown on the contract map and be identifiable in the field.	All lodgepole pine trees which are smaller than eleven (11) inches D.B.H.O.B., except approximately thirty-four (34) trees thereof marked for cutting heretofore by the Government with red paint above and below stump height in the cutting area shown on Exhibit A.
IR-5 All young growth less than (specify diameter) inches D.B.H.O.B. not damaged in the normal course of logging in (give location) shown on Exhibit A.	Use IR-5 to reserve and protect reproduction present on the cutting area. This provision may be of particular importance in two- and three-storied stands. The general area to which this provision applies must be shown on the contract map and be identifiable in the field.	All young growth timber less than eight (8) inches D.B.H.O.B. in the clear cut area shown on Exhibit A.
IR-6 All (identify species) trees in (give location) shown on Exhibit A.	Use IR-6 to reserve all trees of one or more species on a given area while permitting the harvest of all trees of unnamed species. The general area to which this provision applies must be shown on the contract map and be identifiable in the field.	All ponderosa pine and sugar pine trees in the cutting area shown on Exhibit A.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Timber Reservation Provisions

PROVISION	INSTRUCTIONS	EXAMPLES
IR-7 All (identify species) trees except approximately (specify number by species) trees marked for cutting heretofore by the Government (describe how trees are marked) in (give location) shown on Exhibit A.	IR-7 is used to reserve all trees of one or more species except for certain trees of the named species which are marked for cutting. All trees of unnamed species may be cut. The general area to which this provision applies must be shown on the contract map and be identifiable in the field.	All ponderosa pine and sugar pine trees except approximately twenty-four (24) ponderosa pine trees and eighteen (18) sugar pine trees marked for cutting heretofore by by the Government with blue paint above and below stump height in the partial cut area shown on Exhibit A.
IR-8 All timber except (identify species) trees in (give location) shown on Exhibit A.	IR-8 is used to reserve all species of timber found on the cutting area except the named species. The purchaser may cut only trees of the named species. The general area to which this provision applies must be shown on the contract map and be identifiable in the field.	All timber except incense cedar trees in the partial cut area shown on Exhibit A.
IR-9 All timber except (identify species) trees and except approximately (number and species) trees marked for cutting heretofore by the Government with (describe mark) in (give location) shown on Exhibit A.	IR-9 is used to reserve all species of timber found on the cutting area except for the species named and except for certain other trees which have been marked for cutting. The general area to which the provision applies must be shown on the contract map and be identifiable in the field.	All timber except incense cedar trees and except approximately forty-four (44) ponderosa pine trees marked for cutting heretofore by the Government with red paint above and below stump height in the partial cut area shown on Exhibit A.

Timber Reservation Provisions

PROVISION	INSTRUCTIONS	EXAMPLE
AR-3 All timber except logs which were severed from the stump and located within ______ of the centerline of Road No. ______ as shown on Exhibit A prior to the date this contract was entered into.	For use in cull log sales only. For use when cull logging area is within specified distance from centerline of an existing road. Exhibit A shows "Reserve Area" and "Approximate area in which logs were designated for cutting in the Reserve Area".	All timber except logs which were severed from the stump and located with 200 feet of the centerline of Road No. 22-4-17.1 as shown on Exhibit A prior to the date this contract was entered into.
AR-4 All timber shown on the Reserve Area on Exhibit A and all blazed or posted trees which are on or mark the boundary of the Reserve Area. All timber except logs which were severed from the stump prior to the date this contract was entered into in the Special Cutting Area shown on Exhibit A.	For use in cull log sales only. For use when cull logging area boundary is defined from reserve area by blazing or posting. Exhibit A shows "Reserve Area" and "Special Cutting Area."	
AR-5 All timber shown on the Reserve Area and all timber except logs which were severed from the stump prior to the date this contract was entered into in the Special Cutting Area shown on Exhibit A."	For use in cull log sales only. For use when cull logging area is totally within a previous clear cut area and the boundary between the cull logging area and the reserve area is marked by colored flagging. Exhibit A shows "Reserve Area" and "Special Cutting Area." The color of the flagging boundary is described and shown on Exhibit A.	

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Special Provisions

The special provisions here have been developed and approved for use with Form 5450-3, Contract For The Sale Of Timber- Lump-Sum Sale.

The provisions are set forth in the following basic categories:

L - Provisions pertaining to logging

RC - Provisions pertaining to construction

E - Provisions pertaining to environmental protection

M - Provisions pertaining to miscellaneous items

F - Provisions pertaining to fire protection

The provisions are to used as written. Certain provisions require insertion of words or phases appropriate to the situation. Users have certain latitude for choice of appropriate wording within the parenthetic enclosures provided that such choice of wording does not alter or amend the intent of the basic provision.

Situations which require special provisions other than presented herein must be approved by the State Director and Regional or Field Solicitor prior to use. (See .21B5a.)

Special provisions for environmental protection and fire protection for Bureauwide activities are being developed. Pending approval of these two important special stipulation sections, State Directors will develop the necessary environmental protection and fire protection stipulations.

PROVISIONS	INSTRUCTIONS	EXAMPLE
L-1 Before beginning operations on the contract area for the first time or after a shutdown of (number) or more days, the Purchaser shall notify the Authorized Office in writing of the date he plans to begin operations. He shall also notify the Authorized Office in writing if he intends to cease operations for any period of (number) or more days.	Use L-1 when it is desirable to require Purchaser to advise the Authorized Officer of the commencement and cessation of operations on the contract area.	
L-2 Clear cutting (Partial Cutting) where designated shall be (enter completion date or other completion instructions).	Use L-2 to require completion of timber cutting and/or timber harvesting by a specific date for a specific purpose. The use of this provision should not contradict the cutting and removal rights expressed in Section 4 of the contract.	Clear cutting, where designated, shall be completed before March 15, 1976. Partial cutting, where designated, shall be continued without interruption until completed.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
L-3 All trees designated for cutting shall be cut so that the resulting stumps shall not be higher than (specify height) inches measured from the ground on the uphill side of the trees.	Use L-3 to regulate stump heights of trees designated for cutting. This provision is of particular importance on scale sales.	All trees designated for cutting shall be cut so that the resulting stumps shall not be higher than twelve (12) inches measured from the ground on the uphill side of the tree.
L-4 All trees (specify mininum diameter) inches or larger D.B.H.O.B. and not reserved shall be felled in (give location) shown on Exhibit A.	Use L-4 to require the felling of all trees sold or designated for cutting under the contract. This provision is generally associated with clear cutting operations where it is desirable to fall all trees in the area.	All trees eight (8) inches or larger D.B.H.O.B. and not reserved shall be felled in the clear cut area shown on Exhibit A.
L-5 (All snags, culls and marginal trees) (All trees eight (8) inches D.B.H.O.B.) designated for cutting shall be felled concurrently with all other trees designated for cutting in (give location).	Use L-5 to require purchaser to fell trees on a concurrent basis. This provision is particularly applicable where it is desirable to fall snags and culls at the same time as other trees.	All snags, culls, and marginal trees designated for cutting shall be felled concurrently with all other trees designated for cutting in the selective cutting area shown on Exhibit A. All trees eight (8) inches or larger D.B.H.O.B. designated for cutting shall be felled concurrently with all other trees designated for cutting in the same yarding area.
L-6 In the (give location) shown on Exhibit A, all trees designated for cutting shall be felled and cut into log lengths not to exceed (specify maximum log length) feet before being yarded.	Use L-6 to regulate log length in thinning sales where skidding of long logs or by tree lengths may result in excessive damage to the individual stand.	In the entire contract area shown on Exhibit A, all trees designated for cutting shall be felled and cut into log lengths not to exceed thirty-three (33) feet before being yarded.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
L-7 In the (give location) shown on Exhibit A, yarding shall be done (describe equipment requirements or limitations).	Use L-7 to regulate the type of logging equipment to be used on an area.	In the clearcut area shown on Exhibit A, yarding shall be done with high lead-type equipment. In the entire contract area shown on Exhibit A, yarding shall be done with crawler type equipment without bulldozers, angle dozers or arches. In the selective cut area shown on Exhibit A, yarding shall be done with horses or with a tractor of no more than fifty-five (55) drawbar for horsepower.
L-8 In the (give location) shown on Exhibit A, all logs more than (specify minimum diameter) inches in scaling diameter and longer than (specify minimum length) feet in length shall be decked or windrowed at the location (describe location) except logs sold and removed from the contract area.	Use L-8 to require the decking of unmerchantable material on the cutting area. This provision has particular application to areas where it is desirable to prepare the area for reforestation.	In the clearcut area shown on Exhibit A, all logs more than twenty (20) inches in scaling diameter and longer than eight (8) feet in length shall be decked or windrowed at the location designated by the Authorized Officer except logs sold and removed from the contract area.
L-9 No yarding or loading in or through the (describe location) shown on Exhibit A.	Use L-9 in instances where it is essential to prohibit yarding or loading in or through a particular area within the contract area in order to protect specific values.	No yarding or loading is permitted in or through the reserve area shown in Exhibit A.
L-10 Yarding across (identify river or stream) shall be limited to not more than (specify number) crossings. Crossing structures shall comply with plans and specifications shown on Exhibit (identify exhibit).	Use L-10 to provide protection to streams and water courses by regulation of the number and type of crossings permitted.	Yarding across Bear Creek shall be limited to not more than two (2) crossings. Crossing structures shall comply with the plans and specifications shown on Exhibit C.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
L-11 No landing shall be located within (specify distance) feet of (describe location or feature) shown on Exhibit A.	Use L-11 to protect areas, roads, streams, etc., from encroachment of landings.	No landing shall be located within two hundred (200) feet of County Road #20 shown on Exhibit A.
L-12 (Specify landings) shall be placed at the approximate location(s) shown on Exhibit A.	Use L-12 when it is essential to restrict landings to specific locations which have been designated in advance of sale.	All landings in the partial cut area shall be placed at the approximate locations shown on Exhibit A.
L-13 Prior to the commencement of operations, the Purchaser shall obtain from the Authorized Officer written approval of a written operations and logging plan commensurate with the terms and conditions of the contract which shall include measures needed to assure protection of the environment and watershed. All logging shall be done in accordance with the plan. Tractor or wheeled type equipment will not be permitted to operate in or through streams except under special conditions approved in the plan.	L-13 is revised as shown to provide additional emphasis on the need for protection of the environment and the watershed. Operation restrictions which are planned for in the preparation of the contract such as specific logging methods, logging or construction time limits, required location and kind of temporary stream crossing structures, and end haul of excavation material should be incorporated into the special provisions of the contract. The written operation and logging plan should not be a "surprise package" by which the Authorized Officer forces costly major performance requirements upon the Purchaser. Note that the "unless otherwise authorized in writing" phrase in Sec. 41 provides the flexibility for prompt modification of the Operations and Logging Plan when needed.	

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
L-14 There are (specify number) trees marked (describe how trees are marked), located approximately as shown on Exhibit A, that will be used as a check cruise plot. The Purchaser shall fell and buck these trees, separate the bucked logs for examination, and leave such logs in place. The Purchaser shall notify the Authorized Officer when the bucking is completed. Removal of logs is prohibited until written permission is granted by the Authorized Officer.	Use L-14 when it is desirable to establish check cruise plots on timber sale areas. Such plots furnish the appraiser an excellent opportunity to check the accuracy of his cruising.	There are fifteen (15) trees marked with red paint and numbered consecutively from one (1) to fifteen (15), located approximately as shown on Exhibit A, that will be used as a check cruise plot. The Purchaser shall fell and buck these trees, separate the bucked logs for examination and leave such logs in place. The Purchaser shall notify the Authorized Officer when the bucking is completed. Removal of logs is prohibited until written permission is granted by the Authorized Officer.
RC-1 The Purchaser shall (describe construction required) to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law, and in accordance with the plans and specifications listed in Exhibit (identify exhibit) and the location shown on Exhibit (identify exhibit). (RC-1a, RC-1b, RC-1c or RC-1d must be added to RC-1 to complete the provision.)	Use RC-1 to require the construction or improvement of such items as roads, bridges, cattleguards, fences, etc. RC-1 may not stand alone but must be supplemented by the addition of a statement prescribing when and under what conditions such construction must be completed. See RC-1a, RC-1b, RC-1c and RC-1d.	See RC-1a, RC-1b, RC-1c or RC-1d for examples of RC-1 in use.

5424 - PREPARATION OF CONTRACT AND EXHIBITS

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-1a Prior to the removal of any timber (list exceptions, if any) from (describe cutting area), the Purchaser shall complete road construction from (describe limits) shown on Exhibit (identify exhibit).	Add RC-1a to RC-1 when removal of timber purchased is conditioned upon satisfactory completion of road construction.	The Purchaser shall construct the Bear Creek Road to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law, and in accordance with the plans and specifications listed on Exhibit C and the location shown on Exhibit D. Prior to the removal of any timber, except right of way timber from cutting area #1, the Purchaser shall complete road construction for Station 0+00 to Station 50+00 shown on Exhibit D.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-1b Road Construction (list exceptions, if any) shall be completed to each (describe area or location) prior to removal of any timber (list exceptions, if any) from such area. All road construction shall be completed prior to removal of any timber except right-of-way timber from (describe area or location).	Add RC-1b to RC-1 to tie timber removal to completion of road construction on a segment basis. The purpose of the sentence enclosed in brackets is to insure completion of the road prior to removal of all timber. It may be omitted when there are no exceptions to road construction listed in the first sentence.	The Purchaser shall construct the Bear Creek Road to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law and in accordance with the plans and specifications listed on Exhibit C and the location as approximately shown on Exhibit D. Road construction, except surfacing, shall be completed to each clearcut area prior to removal of any timber, except right of way timber, from such areas. All road construction shall be completed prior to removal of any timber except right-of-way timber from clearcut area #6.
RC-1c The (describe requirement) shall be completed (specify when completion is required)	Add RC-1c to RC-1 when it is desirable to require completion of the work by a specified date.	The Purchaser shall construct the Bear Creek Road to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law and in accordance with the plans and specifications listed on Exhibit C and the location as approximately shown on Exhibit D. The required road construction shall be completed within one (1) year after the approval date of this contract.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-1d The Purchaser shall not commence work until receipt of written notice to do so from the Authorized Officer. Work shall be commenced no later than (specify number of days) days after such notice, and shall be completed (specify when completion is required).	Add RC-1d to RC-1 when it is necessary and desirable for the Authorized Officer to regulate the construction period.	The Purchaser shall construct the Mule Creek Bridge to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law and in accordance with the plans and specifications listed on Exhibit C and the locations as approximately shown on Exhibit D. The purchaser shall not commence work until receipt of written notice to do so from the Authorized Officer. Work shall be commenced no later than thirty (30) days after such notice and shall be completed within six (6) months after such notice.
RC-2 The Purchaser is authorized to use the (describe or name road to which this provision applies) which is under the jurisdiction of the Bureau of Land Management from (describe terminal road by legal description) for the removal of Government timber sold under the terms of this contract. (RC-2a, RC-2c or RC-2d must be added to RC-2 to complete the provision.)	Use RC-2 to authorize use of roads off the contract area owned or controlled by the Bureau of Land Management. RC-2 may not stand alone but must be supplemented by the addition of RC-2a, RC-2c, or RC-2d which set forth the road maintenance requirements for such roads.	See RC-2a, RC-2c and RC-2d for examples of RC-2 in use.

PROVISION	INSTRUCTIONS	EXAMPLE
RC-2a Except for roads maintained in accordance with Sec. ____, the Purchaser shall perform road repair and maintenance work on all roads used by him under the terms of this contract as follows:	Use RC-2a when the Purchaser will be required to maintain roads used by him under terms of the contract.	RC-2a Except for roads maintained in accordance with Sec. 41d, the Purchaser shall perform road repair and maintenance work on all roads used by him under the terms of this contract as follows:
(a) Purchaser shall maintain the cross section of dirt or gravelled roads as presently existing or where applicable, to the reconstructed standards required by this contract, by blading and shaping the road surface and shoulders and by the placement of any required maintenance aggregate. Banks shall not be undercut. Established berms shall be maintained and additional berms shall be placed where needed to protect fills as directed by the Authorized Officer.		(a) Purchaser shall maintain the cross section of dirt or gravelled roads as presently existing or where applicable, to the reconstructed standards required by this contract, by blading and shaping the road surface and shoulders and by the placement of any required maintenance aggregate. Banks shall not be undercut. Established berms shall be maintained and additional berms shall be placed where needed to protect fills as directed by the Authorized Officer.
(b) Purchaser shall perform all road cleanup including removal of bank slough, slides and fallen timber, which can practicably be accomplished by a motor patrol grader equipped with a front end blade, rubber-tired front end bucket loader, or comparable equipment, and by the use of hand tools. When working conditions dictate end haul of material, the distance and the quantity of material required to be moved shall be limited to what is reasonable and practicable without the use of additional equipment.		(b) Purchaser shall perform all road cleanup including removal of bank slough, slides and fallen timber, which can practicably be accomplished by a motor patrol grader equipped with a front end blade, rubber-tired front end bucket loader, or comparable equipment, and by the use of hand tools. When working conditions dictate end haul of material, the distance and the quantity of material required to be moved shall be limited to what is reasonable and practicable without the use of additional equipment.
Subject to such limitation, Purchaser shall also replace material eroded from fill slopes and clean out drainage ditches and culverts.		Subject to such limitation, Purchaser shall also replace material eroded from fill slopes and clean out drainage ditches and culverts.
In removing material from slides or other sources, Purchaser shall deposit the material which must be moved at locations chosen with the objective that such material will not erode into streams, lakes, or reservoirs or cause undue damage to road fill slopes which have been planted or mulched to control soil erosion.		In removing material from slides or other sources, Purchaser shall deposit the material which must be moved at locations chosen with the objective that such material will not erode into streams, lakes, or reservoirs or cause undue damage to road fill slopes which have been planted or mulched to control soil erosion.

PROVISION (Con.)	EXAMPLE (Con.)
(c) Purchaser shall perform preventive maintenance at end of Purchaser's hauling each season and during non-hauling periods which occur between operations on the contract area to minimize weather damage to roads during the non-hauling period. This may include, but shall not be limited to, slide repairs, cross-ditching, post-hauling, blading to remove ruts or other surface irregularities which would interfere with normal runoff of water and cleaning of ditches and culverts.	(c) Purchaser shall perform preventive maintenance at end of Purchaser's hauling each season and during non-hauling periods which occur between operations on the contract area to minimize weather damage to roads during the non-hauling period. This may include, but shall not be limited to, slide repairs, cross-ditching, post-hauling, blading to remove ruts or other surface irregularities which would interfere with normal runoff of water and cleaning of ditches and culverts.
(d) While performing road maintenance work, Purchaser should avoid fouling gravel or bituminous surfaces through covering them with earth or debris from side ditches, slides, or other sources. Purchaser shall avoid blading surface material off surface of roads.	(d) While performing road maintenance work, Purchaser should avoid fouling gravel or bituminous surfaces through covering them with earth or debris from side ditches, slides, or other sources. Purchaser shall avoid blading surface material off surface of roads.
(e) Additional requirements should be added for dust abatement, snow removal, etc., as needed in specific situations.	

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-2b With the prior written approval of the Authorized Officer, the Purchaser may arrange for cooperative maintenance with other users of said road(s) described in Sec. (identify section) of this contract Provided, That such cooperative arrange shall not releive the Purchaser of his liability for the maintnance and repair of such roads resulting from wesr or damage, in accordance with this contract.	Use RC-2b in addition to the combination of RC-2 and RC-2a when it is anticipated that roads authorized for use will be used by more than one purchaser during the life of the contract.	With the prior written approval of the Authorized Officer, the Purchaser may arrange for cooperative maintenance with other users of roads described in Sec. 41(c) of this contract, Provided, That such cooperative arrangement shall not relieve the Purchaser of his liability for the maintenance and repair of such roads resulting from wear or damage, in accordance with this contract.
RC-2c Provided, That the Purchaser shall pay the Government a road maintenance fee of (express total fee due in both words and figures) for the transportation of any timber included in this contract price over said road. The above maintenance fee is for the use of (number) ( ) miles of road or less. Unless the total maintenance fee is paid prior to commencement of operations on the contract area, payments shall be made in installments of not less than (specify minimum installment using both words and figures) payable in the same manner as and together with payments required by Sec. 3 of this contract.	Add RC-2c to RC-2 when the Purchaser is required to pay a road maintenance fee to the Government for roads the use of which is authorized by RC-2. RC-2c is used when no alternate routes of access are available. This provision applies to lump-sum sales only.	The Purchaser is authorized authorized to use the Kelsey-Mule Creek Access Road, which is under the jurisdiction of the Bureau of Land Management from the SW1/4SW1/4, Sec. 14, T. 32 S., R. 9 W, W.M., to SE1/4NE1/4, Sec. 13 T. 32 S., R. 8 W., W.M. for the removal of Government timber sold under the terms of this contract: Provided, That the Purchaser shall pay a road maintenance fee of four thousand five hundred and 00/100 dollars ($4,500.00) for the transportation of timber included in the contract area over such road. Unless the total maintenance fee is paid prior to commencement of operations on the contract area, payment shall be made in installments of not less than five hundred and 00/100 dollars ($500.00) payable in the same manner as and together with payments required by Sec. 3 of this contract.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-2d Provided that the Purchaser shall pay the Government a road maintenance fee of (specify amount) per thousand board feet per mile for the use of said roads. For administrative purposes the total maintenance fee due shall be based upon the estimated volume set forth in Exhibit B of this contract and mileage of roads used as determined by the Authorized Officer. In the event logs are hauled over more than one route, the estimated volume set forth in Exhibit B shall be proportioned on the basis of actual volume removed. Prior to the use of such roads, the Purchaser shall give written notice to the Authorized Officer of the roads he intends to use in the removal of the timber purchased under the contract, together with an estimate of the volume to be hauled over such roads. If the total road maintenance fee does not exceed five hundred dollars ($500.00), the Purchaser shall pay such fee in full prior to use of such roads. If the total road maintenance fee exceeds five hundred dollars ($500.00), the Authorized Officer shall establish an installment schedule of payments of the maintenance fees.	Add RC-2d to RC-2 when the Purchaser is required to pay a road maintenance fee to the Government for roads the use of which is authorized by RC-2. RC-2d is used when alternate routes of access are available over the authorized system and it is not known at the time of sale which route or routes will be used. This provision applies to LUMP-SUM SALES ONLY.	The Purchaser is authorized to use the Smith River Access Road System which is under the jurisdiction of the Bureau of Land Management for the removal of Government timber sold under the terms of this contract; Provided, that the Purchaser shall pay the Government a road maintenance fee of ten (10)cents per thousand board feet per mile for the use of said roads. The total maintenance fee due shall be based upon estimated volumes set forth in Exhibit B of this contract and mileage of roads used as determined by the Authorized Officer. In the event logs are hauled over more than one route, the estimated volume set forth in Exhibit B shall be proportioned on the basis of actual volume removed. Prior to the use of such roads the Purchaser shall give written notice to the Authorized Officer of the roads he intends to use in the removal of the timber purchased under this contract, together with an estimate of the volume to be hauled over such roads. If the road maintenance fee does not exceed five hundred and 00/100 dollars ($500.00), the Purchaser shall pay such fee in full prior to use of such roads. If the total road maintenance fee exceeds five hundred and 00/100 dollars ($500.00), the Authorized Officer shall establish an installment schedule of payments of the maintenance fees.

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-2e Provided, That the Purchaser shall pay a road maintenance fee of (specify amount) per thousand board feet log scale per mile for the use of said roads. The total maintenance fee due shall be based upon volumes determined pursuant to Section 2 and 3 of this contract and mileage of roads used as determined by the Authorized Officer. Prior to the use of such roads, the Purchaser shall give written notice to the Authorized Officer of the roads he intends to use in the removal of timber purchased under this contract, together with an estimate of the volume to be hauled over such roads. The Authorized Officer shall establish an installment schedule of payment of the maintenance fee. If it is determined by the Authorized Officer, after all merchantable timber has been cut and scaled, that the total maintenance fee payments made under this contract exceed the total maintenance fee payment due, such excess shall be returned to the Purchaser within sixty (60) days after such determination is made.	Add RC-2e to RC-2 when the Purchaser is required to pay a road maintenance fee to the Government for roads, the use of which is authorized by RC-2. RC-2e is for use with SCALE SALES ONLY and it may be used with either fixed or alternate routes of access.	The Purchaser is authorized to use the Smith River Access Road System which is under the jurisdiction of the Bureau of Land Management for the removal of Government timber sold under the terms of the contract; Provided, that the Purchaser shall pay a road maintenance fee of ten (10) cents per thousand board feet log scale per mile for the use of said roads. The total maintenance fee due shall be based upon volumes determined pursuant to Sec. 3 of this contract and mileage of roads used as determined by the Authorized Officer. Prior to the use of such roads, the Purchaser shall give written notice to the Authorized Officer of the roads he intends to use in the removal of timber purchased under this contract, together with an estimate of the volume to be hauled over such roads. The Authorized Officer shall establish an installment schedule of payment of the maintenance fee. If it is determined by the Authorized Officer, after all merchantable timber has been cut and scaled, that the total maintenance fee payments made under this contract exceed the total maintenance fee payment due, such excess shall be returned to the Purchaser within sixty (60) days after such determination is made.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-3 In the use of (describe road or roads) the Purchaser shall comply with the conditions (describe conditions of use).	Use RC-3 to reference easements or right of way agreements which permit use of third party lands or roads by the Purchaser. The conditions of use may be set out in the contract; a copy of the easement or right-of-way agreement attached, or the availability of such document noted.	In the use of the Deer Creek Road across the SW¼, Sec. 12, T. 12 S., R. 6W., W.M., the Purchaser shall comply with the condition of Right-of-Way and Road-Use Agreement No. M-500 dated February 3, 1962, between the United States of America and ABC Lumber Company. This document is available for inspection at the office of the Authorized Officer.
RC-3a In accordance with 43 CFR 2234.2-3(b)(19)(e) the following allowances have been made for amortization or capital investment of the road covered by road agreement (give number) with the Purchaser. (Insert schedule which identifies road and amount of allowances.) It is understood that the purchase price stated in Sec. 2 of this contract is the net price because of such allowances.	RC-3a must be included in every contract where the Purchaser will use roads covered by a road agreement which the Purchaser executed as a permittee pursuant to 43 CFR 2234.2-3.	In accordance with CFR 2234.2-3 (b)(19)(e) the following allowances have been made for the amortization of capital investment of the road covered by road agreement M-500 with the Purchaser: (1) One thousand five hundred and no/100 dollars ($1,500.00) for Smith Creek Road from west boundary of Sec. 12, T. 16 S., R. 12 W., W.M., to east boundary of Sec. 24, T. 16 S., R. 11 W., W.M. (2) Six hundred and 00/100 dollars ($600.00) for the installation of Smith River Bridge #1. It is understood that the purchase price stated in Sec. 2 of the contract is the net price and no deduction will be made for the purchase price because of such allowance.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-3b In accordance with the terms and conditions of right-of-way permit (give number) the Government is hereby granted an allowance of (specify amount) as payment towards the Government's share of the replacement costs of (name or describe road). It is understood that the purchase price stated in Sec. 2 of this contract is the net price and that no deduction will be made from the purchase price because of such allowance.	RC-3b must be included in every contract where the Purchaser will use roads covered by a detailed permit which the Purchaser executed as a permittee pursuant to 43 CFR 2234.2-3.	In accordance with the terms and conditions of right-of-way permit M-500, the Government is hereby granted an allowance of five hundred and no/100 dollars ($500.00) as payment towards the Government's share of the replacement costs of the Smith Creek Road from the west boundary of Sec. 12, T. 16 S., R. 12 W., W.M. to the east boundary of Sec. 24, T. 16 S., R. 12 W., W.M. It is understood that the purchase price stated in Sec. 2 of this contract is the net price and that no deduction will be made from the purchase price because of such allowance.
E-1 In addition to the requirements set forth in Sec. 25 (or Sec. 22 of Contract Form 5430-4) of this contract, the Purchaser shall (identify measures required which are considered above the normal requirements of Sec. 25 or Sec. 22	Use E-1 when special problems are encountered in the contract area which require treatment in excess of that normally expected of the Purchaser under the terms of Sec. 25 of Form 5430-3 or Sec. 22 of Form 5430-4.	(1) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall remove existing logs and debris from Deer Creek where it flows through the contract area and shall restore any banks damaged by such removal. (2) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall seed all skid roads with rye grass applied at the rate of 10 pounds per acre.
SD-1 In addition to the requirements of Sec. 15 (or Sec. 14 of Contract Form 5430-4) of this contract, the Purchaser shall lop and scatter all slash (give location) concurrently with normal felling operations. All top and side branches must be free of the central stem so that such stem is reduced to the extent that it is within (specify height) inches of the ground at all points.	Use SD-1 when a Purchaser will be required to lop and scatter slash on the contract area.	In addition to the requirements of Sec. 15 of this contract, the Purchaser shall lop and scatter all slash over the entire cutting area concurrently with the normal felling operation. All top and side branches must be cut free of the central stem so that such stem is reduced to the extent that it is within twelve (12) inches of the ground at all points.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
SD-2 In addition to the requirements of Sec. 15 (or Sec. 14 of Contract Form 5430-4) of this contract, the Purchaser shall pile and burn all slash located within (specify distance) feet on each side of (specify road or roads to which the provision applies). Slash shall be piled by (specify method).	Use SD-2 to require piling and burning of slash adjacent to specified roads on the contract area.	In addition to the requirements of Sec. 15 of the contract, the Purchaser shall pile and burn all slash within one hundred (100) feet on each side of each road on the contract area. Slash shall be piled by hand.
SD-3 In addition to the requirements of Sec. 15 (or Sec. 14 of the Contract Form 5430-4) of this contract, the Purchaser shall pile and burn all slash situated in (specify location). Slash shall be piled by (specify method).	Use SD-3 to require the Purchaser to treat slash in a specific manner on specific areas.	In addition to the requirements of Sec. 15 of this contract, the Purchaser shall pile and burn all slash situated in the partial cut area as approximately shown on Exhibit A. Slash shall be piled by a tractor equipped with a special brush piling blade.
M-1 The Purchaser agrees that the United States, its power permittees, lessees, and licensees, shall not be responsible or held liable or incur any liability for the damage, destruction, or loss of any land, crops, facility installed or erected, income, or other property or investment resulting from the use of such lands or portions thereof for power developments at any time where such power development is made by or under the authority of the United States.	M-1 is required to be included in all timber sales located in lands classified, withdrawn, or reserved for power purposes. (See BLM Manual 5403.)	

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
M-2 The Government at its option may check scale any portion of the timber removed from the contract area. The Purchaser hereby agrees to make such contract timber available for scaling at a location designated by the Authorized Officer. If the entire sale is check scaled, the purchase price of this contract shall be reduced by $__________. In the event only a portion of the contract timber is scaled, the purchase price shall be reduced by that portion of $________, equal to the percentage of timber sold which was actually scaled by the Government. For purposes of computing this price reduction, the percentage of timber sold which has been scaled shall be determined by the Government. Any reduction in purchase price under the terms of this provision shall be full compensation to the Purchaser for any expense or loss incurred as a result of such scaling.	For optional truck scale checks of lump sum sales when qualified BLM scalers are available. No allowance is made in timber appraisal for check scaling. Purchaser is not required to pay for overtime scaling or provide a scale platform. Provision allows quality check of cruising. All or part of a sale may be check scaled. Compute truck delay cost for entire sale volume from latest Logging Cost Schedule. Use on contracts of highly defective, high value, old growth timber. See special provision L-14 for check scale or cruise plot.	The Government at its option may check scale any portion of the timber removed from the contract area. The Purchaser hereby agrees to make such contract timber available for scaling at a location designated by the Authorized Officer. If the entire sale is check scaled, the purchase price of this contract shall be reduced by $414.00. In the event only a portion of the contract timber is scaled, the purchase price shall be reduced by that portion of $414.00, equal to the percentage of timber sold which was actually scaled by the Government. For purposes of computing this price reduction, the percentage of timber sold which has been scaled shall be determined by the Government. Any reduction in purchase price under the terms of this provision shall be full compensation to the Purchaser for any expense or loss incurred as a result of such scaling.

Special Provisions

Provision		
RC-4 The Purchaser shall undertake no logging operation on the contract area until he has secured from the appropriate official of the (describe public agency) permission for the use of the existing (describe public agency) road which traverses (describe terminal road by legal description) and permission to construct a new road from the existing road leading from such existing road across (describe public land) in (describe terminal road by legal description) to the contract area.	Use RC-4 when it is necessary to use or construct roads off the contract area on lands which are not owned or controlled by the Bureau of Land Management.	The Purchaser shall undertake no logging operation on the contract area until he has secured from the appropriate official of the Forest Service, U.S. Department of Agriculture, permission for the use of the existing Forest Service road which traverses Section 26, T. 40 N., R. 30 E., M.D.M. and permission to construct a new road leading from such existing road across National Forest land in Sections 26 and 27 T. 40 N., R. 30 E., M.D.M. to the contract area.
L-15 In the (give location) shown on Exhibit A, all trees except those reserved, shall be felled parallel to the contour of the slope and prior to falling trees, except (right-of-way) trees, on the adjacent slope in (give location) above the (give location).	Use L-15 to require contour felling of trees in a clear cut area immediately adjacent and above a buffer strip to prevent timber from sliding into the buffer strip.	In the Special Cutting Area shown on Exhibit A, all trees, except those reserved, shall be felled parallel to the contour of the slope and prior to felling trees, except right-of-way trees, on the adjacent slope in Area #4 above the Special Cutting Area.
L-16 In that portion of the (specify location) on which required skyroads are designated on the ground with (describe how area is marked) and as shown on Exhibit A, the Purchaser shall use a skyline or similar cable system capable of transporting logs completely clear of the ground and capable of yarding (specify distance) feet slope distance from the landing and at least (specify distance) feet laterally from the skyline to the designated skyroad and with minimum damage to reserved trees.	Use L-16 to regulate the type and use of logging equipment to be used on an area.	In that portion of the partial cutting area on which required skyroads are designated on the ground with blue ribbon and as shown on Exhibit A, the Purchaser shall use a skyline or similar cable system capable of transporting logs completely clear of the ground and capable of yarding two thousand (2000) feet slope distance from the landing and at least one hundred and seventy (170) feet laterally from the skyline to the designated skyroad and with minimum damage to reserved trees.

Special Provisions

Provisions	Instructions	Example
F-1 Prior to construction or logging under this contract, the Purchaser shall prepare a fire prevention and fire control plan to the satisfaction of the Authorized Officer.	Use F-1 in contracts operating during periods of fire danger	
F-2 The Purchaser shall provide and maintain in good repair on the contract area the following equipment for use during periods of fire danger.	Use F-2 as a preamble for other "F" provisions. F-2 may not stand alone but must be supplemented by the addition of other "F" provisions.	
F-2a Fire fighting tools shall be kept at each landing or at such other place as the Authorized Officer shall designate whenever men are working on the contract area. All fire fighting tools shall be kept in a sturdily constructed box which shall be painted red and lettered on the front or top in large letters, "For Fire Only." The box shall have a hinged lid and a hasp by which the lid can be sealed. One box may serve two landings not over six hundred (600) feet apart. When filled, the box shall not weigh over two hundred (200) pounds. The fire tools shall be in good condition, be tight on strong handles, and have sharp cutting edges. There shall be not less than four tools in each box nor less than one tool for each man working on the contract area. Three-fourths of all fire tools shall be shovels, hazel hoes, or other scraping tools. The fire tools shall be used only for fighting fire.	Add-F2a to F-2 in contracts during periods of fire danger.	
F-2b A shovel in good condition with not less than a three (3) foot handle and a blade not less than seven and three-quarters (7 3/4) inches wide shall be within fifty (50) feet of any power saw when in operation.	Add F-2B to F-2 in operating during periods of fire danger.	

Special Provisions

Provisions	Instructions	Example
F-2c At each landing during periods of operation (specify number) tank truck(s) of (specify amount) gallons or more capacity with (specify amount) feet of hose and a nozzle acceptable to the Authorized Officer and a mounted or portable pump conforming to the standards set forth in (specify state forest law number). (Specify number) (specify gallons) tank trucks or portable tanks may be substituted for each required (specify gallons) tank truck, provided that the total capability to pump and deliver water remains unchanged. All hose couplings shall have the standard thread adopted by the State Fire Marshall pursuant to (specify state forest law number) or be provided with suitable adapters. At the close of each working day, all bulldozers and tank trucks shall be filled with fuel and made ready for immediate use. All tank trucks and portable tanks shall be filled with water and made available for immediate use.	Add F-2c to F-2 when it is desirable to require additional fire equipment.	At each landing during periods of operation, one (1) tank truck of one thousand (1000) gallons or more capacity with one thousand (1000) feet of hose and a nozzle acceptable to the Authorized Officer and a mounted or portable pump conforming to the standards set forth in Oregon Revised Statutes 477.650(2)(a). Two (2) five hundred (500) gallon tank trucks or portable tanks may be substituted for each required one thousand (1000) gallon tank truck, provided that the total capability to pump and deliver water remains unchanged. All hose couplings shall have the standard thread adopted by the State Fire Marshall pursuant to Oregon Revised Statute 476.030 or be provided with suitable adapters. At the close of each working day, all bulldozers and tank trucks shall be filled with fuel and made ready for immediate use. All tank trucks and portable tanks shall be filled with water and made available for immediate use.
F-2d Serviceable radio or radiotelephone equipment able to provide prompt and reliable communication between the contract area and (City and State). Such communication shall be available during periods of operation including the time watchman service is required.	Add F-2d to F-2 when it is desirable to require communication equipment.	Serviceable radio or radiotelephone equipment to provide prompt and reliable communication between the contract area and Prineville, Oregon. Such communication shall be available during periods of operation including the time watchman service is required.

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Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-le Upon completion of (specify practice), the Purchaser shall scarify the entire road as shown on (identify exhibit) in strips of not more than (specify width) in width to a minimum depth of (specify depth) to prepare the road for reforestation provided that no scrafication shall be required where the road traverses rock outcroppings. All natural water courses shall be opened to prevent erosion of the road. Barriers shall be constructed so as to prevent further use of the road by vehicles.	Add RC-le to RC-1 to require rehabilitation of temporary roads no longer needed for management purposes.	The Purchaser shall construct the Bear Creek Road to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law, and in accordance with plans and specifications listed on Exhibit C and the location shown on Exhibit D. Upon completion of logging operations and slash disposal, the Purchaser shall scarify the entire road as shown on Exhibit C in strips of not more then eighteen (18) inches in width to a minimum depth of ten (10) inches to prepare the road for reforestation, provided that no scarification shall be required where the road traverses rock outcroppings. All natural water courses shall be opened to prevent erosion of the road. Barriers shall be constructed so as to prevent further use of the road by vehicles.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
RC-2f Provided, however, that at any time the Authorized Officer may by written notice terminate the Purchaser's operator road maintenance obligations and require instead payment of a road maintenance fee of (specify amount) per M board feet per mile, said amount to be applied to the remaining contract volume on the sale area to be transported over (give road name and number). The Purchaser shall pay the total maintenance fee for said road within thirty (30) days following receipt of written notice; provided, however, if the total amount exceeds five hundred dollars ($500.00), the Purchaser may elect to make payment in equal installments in the same manner as regular contract installment payments.	Add RC-2f to RC-2a when it is determined that road maintenance responsibility should be shifted from the Purchaser to the Bureau during the life of the contract. The method of determining the remaining contract volume on the sale area at the time of maintenance conversion, which, in turn, will establish the fee to be collected, will be of vital concern to prospective purchasers. The procedure should be explained in detail at the time of the sale. Advise prospective purchasers that the volume determination shall be made by the Authorized Officer, and will not be subject to arbitration.	The Purchaser is authorized to use Kelsey-Mule Creek Access Road, which is under the jurisdiction of the Bureau of Land Management from SW1/4SW1/4, Sec. 14, T. 32 S., R. 9 W., W.M. to SE1/4NE1/4, Sec. 13, T. 32 S., R. 8 W., W.M., for the removal of Government timber sold under this contract; provided, however, that at any time the Authorized Officer may by written notice terminate the Purchaser's operator road maintenance obligations and require instead payment of a road maintenance fee of ten (10) cents per M board feet per mile, said amount to be applied to the remaining contract volume on the sale area to be transported over the Kelsey-Mule Creek Access Road. The Purchaser shall pay the total maintenance fee for said road within thirty (30) days following receipt of written notice; provided, however, if the total amount exceeds five hundred dollars ($500.00), the Purchaser may elect to make payment in equal installments in the same manner as regular contract installment payments.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
See E-1, page 15.	Use these modifications of E-1 when special problems are encountered on the contract area. Examples (3) and (4) are for use on community watersheds.	(3) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall not employ any workman with a history of having had typhoid, amoebic dysentery, or infectious hepatitis. A health certificate to this effect must be filed with the Authorized Officer for each employee. (4) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall establish pit privies, chemical toilets, or water-tight vault-type privies convenient to all principal points of operation. Pits shall be of such depth that contents may be buried at least three (3) feet below the surface before the site is abandoned. At no time shall any pit privy be allowed to fill to within three (3) feet of the ground surface before being backfilled with earth. No privy shall be located closer than three hundred (300) feet from the stream or tributary and sites as nearly level as possible shall be selected. Vault-type privies shall receive proper servicing and maintenance and the waste material shall be disposed of in a manner approved by the local health department and the State Board of Health. Employees shall use the toilet facilities provided. Employees shall be notified of sanitary regulations and fully instructed as to their meaning and importance. The Purchaser is responsible for enforcing the sanitary regulations. No camps shall be allowed. (5) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall furnish to the Government fifty (50) pounds of (fescue) (rye) (crested wheat grass) (highland bent) grass seed for seeding by the Government in the (contract area) (on cuts and fills of the road to be constructed by the Purchaser). 1/

1/ Select appropriate grass mixture for area.

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
See E-1, page 15.	Use these modifications of E-1 when special problems are encountered on the contract area. Examples (3) and (4) are for use on community watersheds.	(6) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall seed (the slopes of all cuts and fills of the Deer Creek Road) with (fescue) (rye) grass to create a sufficient cover to prevent erosion. (8) In addition to the requirements set forth in Sec. 25 of this contract, the Purchaser shall complete seeding, fertilizing, and mulching on cuts, fills, and waste areas as designated by the Authorized Officer along all sections of roadway excavated during the year prior to October 1 of each year. Seeding, fertilizing, and mulching will not be required on cut slopes in areas of rock material. The Authorized Officer may set time limits for the beginning and completion of erosion control measures. Grass seed, fertilizer, mulch, and suitable equipment to apply these materials shall be furnished by the Purchaser. This equipment and material shall be furnished by the Purchaser. The equipment and material shall be approved in writing by the Authorized Officer prior to the start of the seeding, fertilizing and mulching operation. The grass seed mixture shall be mixed in the following proportions by weight and furnished in sealed containers. Grass seed which has become wet, moldy, or otherwise damaged, will not be used. Alta Fescue 45% Creeping Red Fescue 20% Annual Rye Grass 20% Dutch White Clover (Inoculated) 15% All seed used shall meet all requirements of the Federal Seed Act (7 U.S.C. Secs. 1551-1610, incl.) and the seed laws and noxious weed laws of Oregon. Evidence of seed certification shall be furnished at the request of the Authorized Officer. All leguminous seed will be inoculated with approved cultures in accordance with instruction of the manufacturer. The seed used shall meet the following requirements:

Special Provisions

PROVISIONS	INSTRUCTIONS	EXAMPLE
See E-1, page 15.	Use these modifications of E-1 when special problems are encountered on the contract area. Examples (3) and (4) are for use on community watersheds.	Purity 95.0% minimum Germination 85.0% minimum Weed Content 0.5% maximum Fertilizer shall be water soluble commercial fertilizer supplied in combination containing the following ratio: Available nitrogen 16 Available phosphoric acid 20 Potassium 0 Mulch shall consist of straw, hay, or specially prepared wood cellulose fiber processed in such a manner that it contains no growth or germination inhibiting factors and shall be free of noxious weed seed. The Purchaser shall apply grass seed, fertilizer, and mulch uniformly on the designated areas at a rate to give the following coverage per acre: Grass seed 40 pounds per acre Fertilizer 200 pounds per acre Mulch 4,000 pounds per acre No seed, fertilizer, or mulch shall be applied when wind velocities will prevent uniform application of the material on the designated areas.

APPENDIX B

SAMPLE TIMBER SALE CONTRACT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

3-22-74

No. 36110- TS 4-60

CONTRACT FOR THE SALE OF TIMBER

NW LUMP SUM SALE Adv. O&C

THIS CONTRACT is made and entered into the day of MAR 22 1974, 19 , under the authority of the Act of August 28, 1937, (50 Stat. 874), as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947, (61 Stat. 681), as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the UNITED STATES OF AMERICA, hereinafter called the Government, acting through the Bureau of Land Management, and The Robert Dollar Co., a corporation of P. O. Box C, Glendale, Oregon 97442 hereinafter called the Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Timber Sold.* The Government hereby sells to the Purchaser and the Purchaser hereby buys from the Government, under the terms and conditions of this contract, all timber, except that reserved to the Government under Sec. 40 of this contract, within the area designated by the Government, comprising the contract area* and situated in the County of Douglas State of Oregon, and described as follows:

TOWNSHIP	RANGE	SECTION	SUBDIVISION(s)
32 South	5 West	27	Lots 4, 5, 7, NW¼SW¼
		29	E½SW¼, S½SE¼
		33	Lots 4, 5, SW¼NE¼, NW¼, N½SW¼, NW¼SE¼
33 South	5 West	5	Lots 1, 2, 3, S½NE¼, SE¼NW¼

Sec. 2. *Total Purchase Price* – Purchaser agrees to pay Government, as the total purchase price for the timber sold hereunder, the sum of One million, two hundred sixty-three thousand, seven hundred fifty-three, and 25/100------------------- dollars ($1,263,753.25---------); *Provided, however,* that such total purchase price may be adjusted in accordance with Secs. 6, 7, 8, 9, 19, 20, or 41 of this contract.

Sec. 3. *Payment*

(a) Payments under this contract shall be made as set forth in this section.

(b) Unless total purchase price is paid on or before the date this contract is signed by the Authorized Officer, payments shall be made in installments of not less than ten thousand and no/100--------------- dollars ($10,000.00-------) as follows: (1) Except as provided in subsection (c) of this section, the first installment shall be paid on or before the date this contract is signed by the Authorized Officer; (2) Except as provided in subsection (c), (d), and (e) of this section, the second installment shall be paid prior to cutting or removal of any timber sold under this contract. Each subsequent installment shall become due and payable without notice whenever the value of timber cut or removed equals the sum of the second and subsequent installments paid by Purchaser. No timber may be cut or removed until such payment has been made. Purchaser shall continue to make such installment payments until the total purchase price has been paid.

(c) Payment of the first installment, required in subsection (b) of this section, may be delayed if Purchaser increases the performance bond as permitted by Sec. 38(b); *Provided, however,* that cash payment for said installment must be made (1) before cutting or removal of the last portion of timber sold having a value equal to the amount of the first installment, or (2) at any time when Government exercises its authority to cancel the rights of Purchaser in accordance with Sec. 10(a), whichever occurs first.

(d) If Purchaser increases its performance bond, as permitted by Sec. 38(c), cutting of timber of a value not in excess of the increase in value of such bond may be permitted prior to payment of the second or subsequent installments; *Provided, however,* that no timber may be skidded or yarded to a loading point or removed from the contract area prior to payment of any installment which, but for the provisions of this subsection, would otherwise be due under the provisions of Sec. 3(b).

(e) If Purchaser provides a payment bond, as permitted by Sec. 38(e), cutting and/or removal of timber of a value not in excess of the penal sum of such bond may be permitted prior to the payment of the second or subsequent installments. Unless a shorter period is agreed to by Purchaser and Government, Government shall bill Purchaser monthly for timber skidded or yarded to a loading point or removed from the contract area. Such billing shall include any amount due for related road maintenance fees. Purchaser shall make payment within fifteen (15) days of the billing date shown on the billing form.

(f) For the purpose of determining (1) when payments are due or (2) the value of timber subject to any special bonding provision, Government shall calculate the value of timber in accordance with the provisions of *Exhibit B,* which is attached hereto and made a part hereof.

(g) Purchaser shall pay the total purchase price not later than the expiration of the time for cutting and removal as set forth in Sec. 4. Purchaser shall make all payments at the office of Authorized Officer in cash, or by money order, bank draft, or check made payable to the Bureau of Land Management.

(h) For any payments or other charge not paid when due, interest shall accrue on the unpaid amount at the rate of six (6) percent per annum, beginning fifteen (15) calendar days after the end of the payment period.

Sec. 4. *Time for Cutting and Removal* – Except as otherwise provided in this contract, Purchaser may begin cutting and removing timber sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut and remove such timber shall expire thirty-six------------------------- (36) months after such date; *Provided, however,* extensions of time may be granted as provided in Sec. 9.

Sec. 5. *Definitions*

(a) *Authorized Officer* – any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) *Timber* – standing trees, downed trees, or logs, which are capable of being measured in board feet.

(c) *Loading point* – any landing or other area in which logs are capable of being loaded for transportation out of the contract area; *Provided, however,* that right-of-way timber which has been cut shall not be considered to be at a loading point until such time as logs from any source are actually transported over that portion of the right-of-way.

Sec. 6. *Inspection of Timber and Disclaimer of Warranty*

(a) Purchaser warrants that this contract is accepted and executed on the basis of its examination and inspection of the timber sold under this contract and its opinion of the value thereof.

(b) Government expressly disclaims any warranty of fitness of the timber for any purpose; all timber sold hereunder is accepted *As Is* without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the timber sold hereunder is expressly disclaimed by Government. Refund to or recovery by Purchaser for failure of title to any timber sold hereunder shall not exceed the value of such timber computed at prices per unit for species involved as set forth in *Exhibit B.*

Sec. 7. *Passage of Title and Risk of Loss* – Title to timber sold under this contract shall remain in Government and shall not pass to Purchaser until such timber has been paid for and removed from the contract area. Unless cut timber is sold under this contract, risk of loss shall be borne by Purchaser after the timber is cut; *Provided, however,* that if loss results from a fire which was not caused by Purchaser, his contractors, subcontractors, or the employees of any of them, the risk of loss shall be borne by the party holding title. If cut timber is sold under this contract, risk of loss shall be borne by the party holding title. Risk of loss to Government shall not exceed the value of such timber computed at the prices per unit for the species involved as set forth in *Exhibit B*. Nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act. As used in this section, the term *cut timber* refers only to timber which has been felled, bucked, or otherwise severed by direct human activity prior to the date this contract was entered into.

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* *General location of contract area is shown on map marked Exhibit A which is attached hereto and made a part hereof*

Sec. 8. Sales of Additional Timber – If the Authorized Officer and Purchaser agree that additional timber should be removed and the Authorized Officer determines that the sale will not be detrimental to the interests of Government and is within the provisions of 43 CFR 5402.0–6, the Authorized Officer shall grant written permission to Purchaser to cut and remove such timber. If permission is granted, Purchaser shall pay for such timber at a price determined by the Authorized Officer in accordance with the Bureau of Land Management prescribed procedures. The value and volume of such timber shall be added to *Exhibit B* and the value thereof shall be added to total purchase price in Sec. 2. Payment for such timber shall be made in accordance with Sec. 3(b) or 3(e), except that, if all contract payments required by Sec. 3(b) or 3(e) have been made, payment for such timber shall be made in advance as a condition of granting such permission.

Sec. 9. Extension of Time and Reappraisal – If Purchaser shows that delay in cutting and removal was due to causes beyond his control and without his fault or negligence, the Authorized Officer may grant an extension of time, not to exceed one year, upon written request of Purchaser. Such written request shall be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in Sec. 4. If an extension of time is granted, as provided in this section, timber remaining on contract area shall be reappraised by the Authorized Officer, using Bureau of Land Management prescribed procedures, and the total purchase price adjusted accordingly; *Provided, however*, no adjustment shall be made by reason of timber being enhanced in value by Purchaser, nor shall the reappraised total purchase price be less than the total purchase price in effect during the original time for cutting and removal or the last extension. The Authorized Officer may require that the reappraised total purchase price shall be paid in advance as a condition of granting an extension. Market fluctuations shall not be cause for consideration of contract extensions.

Sec. 10. Violations, Suspension, and Cancellation

(a) If Purchaser violates any provision of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, except such operations as may be necessary to remedy the violation. If Purchaser fails to remedy the violation within thirty (30) days after receipt of a suspension notice, the Authorized Officer may, by written notice, cancel the rights of the Purchaser under this contract and take appropriate action to recover all damages suffered by Government by reason of such violation, including application toward payment of such damages of any advance payments and any performance bonds or, where applicable, any payment bonds; *Provided, however*, that if the violation involves nonpayment of amounts due for timber cut and/or removed under a payment bond of a corporate surety, the Authorized Officer must, in addition to the above requirements, allow sixty (60) days after making demand upon surety for any payment due before cancelling the rights of Purchaser.

(b) If Purchaser cuts or removes any timber sold under this contract during any period of suspension, such cutting or removal shall be considered a wilful trespass and render Purchaser liable for damages under applicable law. Any payment made for purchase price of timber cut or removed in trespass shall be deducted to the extent of single damages or the value of timber under this contract, whichever is lesser, from amount due because of trespass.

(c) If Purchaser's operations are suspended because of Purchaser's failure to make an installment payment when due, the Authorized Officer may require Purchaser to pay the entire remaining balance of the purchase price as a condition of terminating the suspension.

(d) If Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber reserved under this contract, they shall fully cooperate, upon request of the Authorized Officer, in the investigation of such acts. If in the opinion of the Authorized Officer, full cooperation is not received or will not be forthcoming, he may suspend that portion of Purchaser's operations necessary to preserve evidence pending investigation or permit safe investigation of such acts.

Sec. 11. Credit Against Purchase Price – If the time specified for cutting and removal of timber has expired or the rights of Purchaser have been cancelled, Purchaser shall be entitled to a credit against any amount which is due and owing Government for timber remaining on the contract area. The Authorized Officer shall determine the credit value of the remaining timber as soon as possible after the date of expiration or cancellation. Credit value of the remaining timber shall be total market value, as established by the Authorized Officer by reappraisal or resale, or total value based upon contract unit prices, whichever is less. There shall be deducted from credit value such amounts as the Authorized Officer determines adequate to cover costs to Government resulting from Purchaser's failure to perform, including but not limited to costs of appraising and administering any resale of timber.

Sec. 12. Responsibility for Damage Suffered, Cost, or Expense Incurred by Government – Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 13. Timber Trespass – If in connection with operations hereunder Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber, other than timber sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 14. Protection of Utilities and Improvements – Existing telephone, telegraph and transmission lines, fences, ditches, roads, trails, and other improvements shall be protected as far as practicable in all phases of Purchaser's construction or logging operations. All roads and trails, designated by the Authorized Officer as needed for fire protection or other purposes, shall be kept free of logs, slash, and debris. Damage to utilities and improvements shall be promptly paid for or repaired to a condition which, in the opinion of the Authorized Officer, is at least as good as the condition just prior to such damage.

Sec. 15. Fire Prevention and Slash Disposal – Purchaser shall take such measures for prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations as are required by applicable laws and regulations. *However*, when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 16. Construction, Use and Maintenance of Roads and Facilities

(a) Subject to the written approval of and regulation by the Authorized Officer, Purchaser may: (1) construct and use any new roads and facilities not otherwise provided for in this contract, and (2) use any existing roads and facilities not otherwise provided for in this contract.

(b) Except as provided in Sec. 12, Purchaser shall perform or pay for repair and maintenance of any road or facility used under the terms of this contract in accordance with the requirements of Sec. 41; *Provided, however*, that Purchaser shall not be responsible for maintenance or repair of wear or damage caused by third parties, or maintenance or repair which exceeds the standards of required maintenance shown in Sec. 41; and *Provided, further*, that Purchaser's responsibility under this provision shall not commence prior to the date on which he first begins operations and shall cease upon completion and written acceptance of all contract requirements other than slash disposal, except for maintenance and repair of damages resulting from Purchaser's slash disposal activities.

Sec. 17. Limitations of Road Use

(a) Purchaser's right under this contract to use existing Government roads described herein, or roads to be constructed, is limited to removal of timber sold under this contract; *Provided, however*, that this provision shall not limit any right to use Government roads or rights-of-way which have been granted to Purchaser pursuant to 43 CFR Group 2800.

(b) For the purpose of protecting roads described herein, Purchaser shall immediately discontinue use of said roads upon receipt of written notice that the Authorized Officer has determined that continued use will cause excessive damage to said roads.

Sec. 18. Acceptance of Road Construction

(a) Whenever Purchaser shall deliver to the Authorized Officer a written statement that the road construction is complete, pursuant to the contract terms, the Authorized Officer shall promptly inspect such road. If the contract road construction requirements have been completed to the satisfaction of the Authorized Officer, Purchaser will be given written notice of acceptance, and, except as provided in Sec. 12, be released from further liability or duty for construction or reconstruction of such road.

(b) Notwithstanding acceptance of any road under this section, Purchaser shall remain liable for maintenance and repair of any such road in accordance with the provisions of Sec. 16.

Sec. 19. Cost Adjustment for Physical Changes – If, prior to acceptance of a road under Sec. 18, a major physical change, caused by a single event, and not due to negligence of Purchaser, his contractors, subcontractors, or the employees of them, results in additional work by Purchaser olving an additional estimated cost of more than (1) $1,000 or sales under one million board feet; (2) $1.00 per thousand board feet for sale of one to three million board feet; or (3) $3,000 for sales over three million board feet, Government shall become responsible for any estimated cost which exceeds the above amounts. Government may elect to meet its share by reducing the purchase price or by payment of such cost to Purchaser or by performing its share of the necessary work. The estimated cost of additional work shall be calculated by the Authorized Officer using Bureau of Land Management prescribed appraisal procedures. Such cost shall include the cumulative estimated costs of repairing damage from slides, washouts, landslips, fire, etc. caused by said event. If necessary, plans and specifications shall be revised to meet the new conditions. Purchaser must obtain advance approval from the Authorized Officer for such additional work in order for Purchaser to be eligible for cost adjustment under this section.

Sec. 20. *Design Change* – If Purchaser and the Authorized Officer agree on a design change of a substantial nature in any road, road structure, or bridge required to be constructed or improved under the terms of this contract, the total purchase price shall be revised to reflect the estimated increase or decrease in cost resulting from such design change. A design change of substantial nature is one that would result in a cost adjustment of $1,000 or more.

Sec. 21. *Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser* – If any of Purchaser's obligations remain unperformed after expiration of the time for removal of personal property, as set forth in Sec. 39, or if the rights of Purchaser under this contract have been cancelled by Government, all provisions of this contract for the benefit and protection of Government or third parties shall remain in effect until this contract is terminated in its entirety by Government.

Sec. 22. *Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees* – Purchaser shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the contract area. If any monuments, corners, or accessories are destroyed, obliterated, or damaged by such operations. Purchaser shall hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories, at the same location, using surveying procedures in accordance with the *Manual of Instructions for the Survey of the Public Lands of the United States*, and shall record such survey in appropriate county records. The Authorized Officer may prescribe in writing additional requirements for protection of monuments, corners, and bearing trees.

Sec. 23. *Purchaser's Representative* – At all times when construction or logging operations are in progress, Purchaser shall have a representative readily available in the area of such operations who shall be authorized to receive, in behalf of Purchaser, any notices or instructions from the Authorized Officer in regard to performance under this contract. Purchaser shall take such action as is required by the terms of this contract.

Sec. 24. *Simultaneous Use of Contract Area by Others* – If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 25. *Watershed Protection: Water Quality, Erosion Control and Soil Damage*

(a) Purchaser shall comply with all applicable State and Federal laws and regulations pertaining to water quality in connection with any operations under this contract.

(b) Purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If Purchaser's operations cause pollution or obstruction of any stream, lake, or reservoir on or near the contract area, Purchaser shall correct the condition to the satisfaction of the Authorized Officer.

(c) Purchaser shall undertake every reasonable measure to minimize erosion and soil damage in connection with any operations under this contract, including but not limited to construction of water bars on yarding and spur roads as designated by the Authorized Officer. Purchaser shall immediately discontinue any construction or timber harvesting operations under this contract, upon receipt of written notice from the Authorized Officer that due to weather or soil moisture conditions, such operations will cause excessive damage to the soil. The Authorized Officer shall notify Purchaser, in writing, when such operations may be resumed.

Sec. 26. *Refuse Control and Disposition of Waste Materials*

(a) Purchaser shall, to the satisfaction of the Authorized Officer, remove, or otherwise dispose of all garbage, temporary buildings, trash, litter, discarded equipment or parts, waste materials or other refuse resulting from Purchaser's operations. Areas for disposal of waste material shall be subject to approval of the Authorized Officer.

(b) Waste materials, such as garbage, trash, oil, grease, chemicals and similar substances shall be disposed of in a manner that will prevent their entry by drainage, high water, or other means into any river, watercourse, lake, or reservoir in or near Purchaser's operations. Water used to wash down equipment used for petroleum products, industrial chemicals, cement or other toxic materials shall be disposed of in a manner that will prevent their entry into any watercourse or waterway.

Sec. 27. *Storage and Handling of Hazardous Materials* – All petroleum products, industrial chemicals and similar toxic or volatile materials stored by Purchaser on or near the contract area, in connection with operations under this contract, shall be stored in durable containers and shall be stored in areas, as determined by the Authorized Officer, which are either located so that any accidental spillage will not drain into any watercourses, lakes, or reservoirs or, when such areas are not available, shall be stored in an area surrounded by impermeable containment dikes of sufficient capacity to contain the aggregate capacity of all tanks.

In addition, Purchaser shall comply with all applicable State and Federal laws and regulations concerning the storage, handling, use and disposal of industrial chemicals, pesticides, herbicides, and other hazardous substances.

Sec. 28. *Safety and Health* – Purchaser shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health and sanitation laws, codes, and regulations and shall make it possible for the Authorized Officer to inspect such operations.

Sec. 29. *Equal Opportunity* – During the performance of this contract, Purchaser agrees as follows:

(a) Purchaser will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this section.

(b) Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of Purchaser's commitments under this section. and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Purchaser's noncompliance with this section, contract may be cancelled, terminated or suspended in whole or in part and Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) Purchaser will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor, or vendor. Purchaser will take such action with respect to any subcontract, or purchase order, as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however*, that in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor, or vendor as a result of such direction by the contracting agency, Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 30. *Records and Reports* – Upon request of the Authorized Officer, Purchaser shall furnish the following records and reports: (1) volume or quantity of timber cut and removed from the contract area; (2) road costs including road use fees paid in connection with removing timber from the contract area; and (3) prices received for lumber or other wood products.

Sec. 31. *Unsatisfactory Bond* – Whenever any performance or payment bond furnished under this contract becomes unsatisfactory to the Authorized Officer, he may require a new bond which is satisfactory to him.

Sec. 32. *Assignments*

(a) Purchaser may not assign this contract or any interest therein without written approval of the Authorized Officer. An assignment shall contain all the terms and conditions agreed upon by the parties thereto.

(b) The Authorized Officer will not approve any assignment involving contract performance unless assignee: (1) is authorized to transact business in the State indicated in Sec. 1; (2) submits such information as is necessary to assure the Authorized Officer of his ability to fulfill the contract; and (3) furnishes a performance bond as required by Sec. 38 or obtains a commitment from the previous surety to be bound by the assignment when approved. Upon approval of an assignment by the Authorized Officer, the assignee shall be entitled to all the rights and subject to all the obligations of this contract and the assignor shall be released from any further liability under this contract.

Sec 33. Contingent Fees – Purchaser warrants that no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial agencies maintained by Purchaser for the purpose of securing business. For breach or violation of this warranty, Government shall have the right to cancel this contract without liability or, in its discretion, to require Purchaser to pay, in addition to the contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

Sec. 34. Successors in Interest – Every obligation hereunder shall extend to and be binding upon the successors in interest of the parties hereto and every benefit hereunder shall inure to such successors.

Sec. 35. Exercise of Rights or Duties of the Authorized Officer – The rights or duties of the Authorized Officer may be exercised by the Authorized Officer or his designated representative.

Sec. 36. Officials not to Benefit – No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4, shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom, and the provisions of Section 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Sections 431, 432, and 433, Title 18, U.S.C., relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 37. Appeal – An appeal may be taken from any decision of any officer of the Bureau of Land Management to the Board of Land Appeals pursuant to the Rules of Practice (43 CFR Part 4 Subpart E).

Sec. 38. Bond

(a) A performance bond shall be filed by Purchaser on or before the date this contract is signed by the Authorized Officer in the amount of two hundred fifty-two thousand, eight hundred &00/100 dollars ($252,800.00).

(b) If Purchaser elects to increase the amount of the performance bond required above by an amount equal to the first installment, in order to secure the delayed payment of said installment, as provided in Sec. 3(c), increased bond shall be on a form approved by the Director of the Bureau of Land Management which upon completion must be approved, in writing, by the Authorized Officer. If a corporate surety bond is used, the bond shall provide that the Surety will pay to Government the amount of the increase within sixty (60) days after demand by Government whenever the Principal shall fail to make payment as required in Sec. 3(c).

(c) If Purchaser elects to cut timber before payment of the second or subsequent installments, Purchaser shall increase the amount of the required performance bond by an amount equal to one or more installments, as set forth in Sec. 3(b). The adjusted bond must be approved, in writing, by the Authorized Officer prior to cutting any timber under the adjusted bond. The increased amount of bond shall be used to assure payment for such timber. Timber cut pursuant to this subsection may be paid for in installments. Upon payments, the increased amount of bond may be applied to other timber sold under this contract to permit its cutting in advance of payment.

(d) As contract provisions are completed to the satisfaction of the Authorized Officer, he may, in his discretion, reduce amount of performance bond required; *Provided, however,* the performance bond may not be reduced below the amount of two hundred fifty-two thousand, eight hundred and no/100------ dollars ($252,800.00) until total purchase price has been paid. The performance bond shall be forfeited to the amount of damages, determined by the Authorized Officer if all contract provisions are not faithfully and fully performed by Purchaser. If the amount of damages exceeds the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled or, if cash or negotiable securities are furnished in lieu of a performance bond, such cash or negotiable securities shall be returned to Purchaser. In event of litigation, any determination by the Authorized Officer as to the amount of damages will be subject to review by a court of competent jurisdiction.

(e) If Purchaser elects to: (1) cut and remove timber or (2) remove timber already cut which has been secured by an increased performance bond as provided in Sec. 38(c), before payment of the second or subsequent installments, Purchaser shall obtain a payment bond in an amount equal to one or more installments as set forth in Sec. 3(b). The payment bond must be approved, in writing, by the Authorized Officer prior to cutting or removing any timber under the bond. The amount of the bond shall be used to assure payment for such timber, *Provided, however,* that such bond shall be considered as payment under Sec. 7, for the purpose of passing title and risk of loss to timber sold. Timber cut pursuant to this subsection shall be paid for as provided in Sec. 3(e). Upon payment, the amount of the bond may be applied to other timber to permit its cutting and/or removal in advance of payment. If a bond of a corporate surety is used, it shall provide that, if Purchaser fails to make payment as required by Sec. 3(e), the surety will make such payment including interest as specified in Sec. 3(h), to Government within sixty (60) days after demand by Government.

Sec. 39. Time for Removal of Personal Property – Purchaser shall have the right within two (2) months after expiration of time for cutting and removal to remove his equipment, improvements, or other personal property from Government lands or rights-of-way; *Provided, however,* that any improvements such as road surfacing, culverts and bridges which have become a permanent part of a Government road, shall not be removed. The Authorized Officer may, in his discretion, grant an extension of time, not to exceed three (3) months for removal of personal property. Any equipment, improvements, or other personal property remaining on Government lands and rights-of-way at the end of the period for removal, or any extension, shall become the property of Government.

Sec. 40. Timber Reserved from Cutting – The following timber on the contract area is hereby reserved from cutting and removal under the terms of this contract and is retained as the property of Government.

(A) All timber on the reserve areas shown on Exhibit A and all blazed, painted or posted trees which are on or mark the boundaries of reserve areas shown on Exhibit A.

(B) All timber in the partial cut area as shown on Exhibit A except approximately five thousand, one hundred ninety-four (5,194) trees which have been marked for cutting heretofore by the Government with blue paint above and below stump height.

(C) All timber except approximately fifty-eight (58) trees which have been marked for cutting heretofore by the Government with blue paint above and below stump height in the approximate area in which trees are marked for cutting in the reserve area shown on Exhibit A.

Sec. 41. Special Provisions – Purchaser shall comply with the special provisions which are attached hereto and made a part hereof unless otherwise authorized, in writing, by the Authorized Officer.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day first above written.

~~If Individual or Partnership, sign here:~~

(Name of Firm)

(Name)

(Address)

(Name)

(Address)

(Name)

~~(Address)~~

If Corporation, sign here:

The Robert Dollar Co.
(Name of Corporation)

R. Stanley Dollar Jr.
(Name)

PRESIDENT
(Title)

UNITED STATES OF AMERICA

By Sam J. [illegible]
(Name)

District Manager
(Title)

APR 30 1974
(Date)

(If Purchaser is a corporation, the following certificate must be executed by the Secretary or Assistant Secretary of the Corporation)

I, R. P. SEELEY, certify that I am the Secretary of the corporation named as Purchaser herein; that R STANLEY DOLLAR, JR., who signed the contract was then PRESIDENT of said corporation, that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

[CORPORATE SEAL]

Appendix B

Dist.

SPECIAL PROVISIONS

(A) Logging Stipulations

(1) All timber sold to the Purchaser under the terms of this contract is restricted from export from the United States in the form of unprocessed timber. For the purpose of this contract, unprocessed timber is defined as (a) any logs, such as sawlogs, peeler logs, and pulp logs; (b) cants and squares to be subsequently remanufactured exceeding a nominal eight (8) inches in thickness; or (c) split or round bolts or other roundwood not processed to standards and specifications suitable for end product use.

In the event the Purchaser elects to sell any or all of the timber sold under this contract in the form of unprocessed timber, the Purchaser shall require each party buying, exchanging, or receiving such timber to execute a "Certificate as to Domestic Processing of Timber." The original of such certification shall be filed with the Authorized Officer.

Prior to the termination of this contract, the Purchaser shall submit to the Authorized Officer a "Log Scale and Disposition of Timber Removed Report" which shall be executed by the Purchaser. In addition, the Purchaser is required under the terms of this contract to retain for a three-year period from the date of termination of the contract, the records of all sales or transfer of logs involving timber from the sale for inspection and use of the Bureau of Land Management.

Unless otherwise authorized in writing by the Authorized Officer, the Purchaser shall prior to the removal of timber from the contract area, brand with the Purchaser's registered log brand at least one end of each log, bolt or other roundwood and identify each of these by painting with highway yellow paint.

In the event of the Purchaser's noncompliance with this subsection of the contract, the Authorized Officer may take appropriate action as set forth in Section 10 of this contract. In addition, the Purchaser may be declared ineligible to receive future awards of Government timber for a period of one year.

(2) The Government at its option may check scale any portion of the timber removed from the contract area. The Purchaser hereby agrees to make such contract timber available for scaling at a location designated by the Authorized Officer. In the event BLM elects to check scale and if such check scaling causes a delay in log transportation time, an adjustment will be made to the purchase price as follows. If the entire sale is check scaled, the purchase price of this contract shall be reduced by $4,627.01. In the event only a portion of the contract timber is scaled, the purchase price shall be reduced by that portion of $4,627.01 equal to the percentage of timber sold which was actually scaled by the Government. For purposes of computing this price reduction, the percentage of timber sold which has been scaled shall be determined by the Government. Any reduction in purchase price under the terms of this provision shall be full compensation to the Purchaser for any expense or loss incurred as a result of such scaling.

(3) Before beginning operations on the contract area for the first time or after a shutdown of seven (7) or more days, the Purchaser shall notify the Authorized Officer of the date he plans to begin operations. He shall also notify the Authorized Officer if he intends to cease operations for any period of seven (7) or more days.

(4) No tractor logging operations shall be conducted on the contract area between October 31 of one calendar year and April 15 of the following calendar year, both days inclusive.

(5) All snags, culls and marginal trees designated for cutting shall be felled concurrently with all other trees designated for cutting as shown on Exhibit A.

(6) In the partial cut area and the approximate area in which trees are marked for cutting in the Reserve Area shown on Exhibit A, yarding shall be done with crawler-type equipment without blades. Maximum width of the crawler equipment without blade shall be eight and one-half (8½) feet.

(7) In the special yarding area shown on Exhibit A, yarding shall be done with a slackline or skyline cable system utilizing a carriage.

(8) In the stream protection area shown on Exhibit A, all logs greater than six (6) inches in scaling diameter and longer than six (6) feet in length shall be removed from the stream channel and deposited at a point designated by the Authorized Officer. The removal of this material shall be done in concurrence with normal yarding operations and shall be done either by hand or with a slackline or skyline cable system.

(9) Prior to the commencement of operations, the Purchaser shall obtain from the Authorized Officer written approval of a written operations and logging plan commensurate with the terms and conditions of the contract which shall include measures needed to assure protection of the environment and watershed. All logging shall be done in accordance with the plan. Tractor- or wheeled-type equipment will not be permitted to operate in or through streams except under special conditions approved in the plan.

(B) Road Construction - Use - Maintenance - Improvement

(1) The Purchaser shall construct and improve the roads to the satisfaction of the Authorized Officer in a good and workmanlike manner, in conformity with law and in accordance with the location, plans and specifications listed in Exhibit C.

(2) Prior to removal of any timber, other than right-of-way timber, from the contract area, the Purchaser shall complete road improvement of Road No. 32-5-22 and #32-5-33.4 as indicated on Exhibits A and C.

(3) Road construction, and/or improvement, shall be completed to each subsale prior to removal of any timber, except right-of-way timber, from such area. All road construction shall be completed prior to removal of any timber, except right-of-way timber, from subsale E.

(4) The Purchaser is authorized to use the Murphy Road #32-5-22 and Roads #32-5-33.2\ and #32-5-33.4, shown on Exhibits A and C, which are under the jurisdiction of the Bureau of Land Management for the removal of Government timber sold under the terms of this contract; provided that, at all times during the period of his operations on the contract area, and upon completion of said operations, the Purchaser shall be liable for maintenance and repair of such roads resulting from wear or damage, except damage caused by major catastrophes or disasters resulting from Acts of God, flood, fire, war or riots, or wear or damage caused by third party users.

(5) Except for roads maintained in accordance with Section 16, the Purchaser shall perform road repair and maintenance work on all roads used by him under the terms of this contract as follows:

(a) Purchaser shall maintain the cross section of dirt or gravelled roads as presently existing or where applicable, to the reconstructed standards required by this contract, by blading and shaping the road surface and shoulders and by the placement of any required maintenance aggregate. Banks shall not be undercut. Established berms shall be maintained and additional berms shall be placed where needed to protect fills as directed by the Authorized Officer.

(b) Purchaser shall perform all road cleanup including removal of bank slough, slides and fallen timber, which can practicably be accomplished by a motor patrol grader equipped with a front-end blade, rubber-tired front-end bucket loader, or comparable equipment, and by the use of hand tools. When working conditions dictate end haul of material, the distance and the quantity of material required to be moved shall be limited to what is reasonable and practicable without the use of additional equipment.

Subject to such limitation, he shall also replace material eroded from fill slopes and clean out drainage ditches and culverts.

In removing material from slides or other sources, Purchaser shall deposit the material which must be moved at locations chosen with the objective that such material will not erode into streams, lakes or reservoirs, or cause undue damage to road fill slopes which have been planted or mulched to control soil erosion.

(c) Purchaser shall perform preventive maintenance at end of Purchaser's hauling each season and during nonhauling periods which occur between operations on the contract area to minimize weather damage to roads during the nonhauling period. This may include, but shall not be limited to, slide repairs, cross-ditching, post-hauling blading to remove ruts or other surface irregularities which would interfere with normal runoff of water and cleaning of ditches and culverts.

(d) While performing road maintenance work, Purchaser should avoid fouling gravel or bituminous surfaces through covering them with earth or debris from side ditches, slides, or other sources. Purchaser shall avoid blading surface material off surface of roads.

(e) Ice and snow removal from Bureau of Land Management roads is considered to be an extraordinary cost and not a part of normal maintenance. No snow or ice shall be removed from a Bureau-of-Land-Management-controlled road unless prior written approval has been secured from the District Manager. The Purchaser shall make his request for permission to remove ice or snow in writing at least four (4) working days in advance of the date operations are to begin.

The letter authorizing snow or ice removal will contain conditions and equipment requirements to be met by the Purchaser.

(f) The Purchaser shall perform the following specific maintenance:

Not later than June 30th of each summer that the contract is in effect, open the road sufficiently to permit the use of the road by firefighting equipment.

Remove, by blasting or digging, large rocks which protrude from the roadbed and interfere with blading. Holes in the road surface caused by such removal shall be filled with compacted fill material of the same type as the road surface.

(6) In the construction of the road across the S½NE¼, E½SE¼ Sec. 32, Township 32 South, Range 5 West, Will. Mer., as shown on Exhibit C, the Purchaser shall comply with the conditions of the Right-of-Way and Road Use Agreement M-887, dated November 17, 1969, between the United States of America and The Robert Dollar Co. available for inspection at the Bureau of Land Management, Medford District Office, 6th and Holly Streets, Medford, Oregon.

(7) In the construction of the road across the NW¼NE¼, Sec. 13 Township 32 South, Range 5 West, Will. Mer., as shown on Exhibit C, the Purchaser shall comply with the conditions of the Right-of-Way and Road Use Agreement M-824, dated December 20, 1966, between the United States of America and C & D Lumber Co., available for inspection at the Bureau of Land Management, Medford District Office, 6th and Holly Streets, Medford, Oregon. Prior to commencement of operations, the Purchaser shall furnish to the Authorized Officer a copy of the required executed License Agreement.

(C) Fire Prevention and Control

(1) Slash will be disposed of only in accordance with the written instructions of the Authorized Officer. Such instructions will require burying of right-of-way slash outside the road prism and piling or burying of slash at landings.

(2) Prior to construction or logging under this contract, the Purchaser shall prepare a fire prevention and fire control plan to the satisfaction of the Authorized Officer.

(D) Equal Opportunity in Employment

Certification of Nonsegregated Facilities attached hereto and made a part hereof.

Form 1140-3
(June 1969)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EQUAL OPPORTUNITY IN EMPLOYMENT CERTIFICATION OF NONSEGREGATED FACILITIES

Bid, offer or contract number or other identification:

36110-TS4-60

By the submission of this bid or offer and/or by entering into this contract, the bidder, offeror, lessee, subcontractor, or applicant certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means, but is not limited to, any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

In accordance with 41 CFR 60, as amended May 19, 1967, and Executive Order No. 11246 of September 24, 1965, as amended, this certification is applicable to all bids, offers, contracts and subcontracts as well as agreements with applicants who are themselves performing federally assisted contracts, which may exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause of the Order.

GPO 881-083

Appendix B

U.S.D.I. BLM MEDFORD DISTRICT SALE NO. 74-36. TIMBER SALE CONTRACT MAP

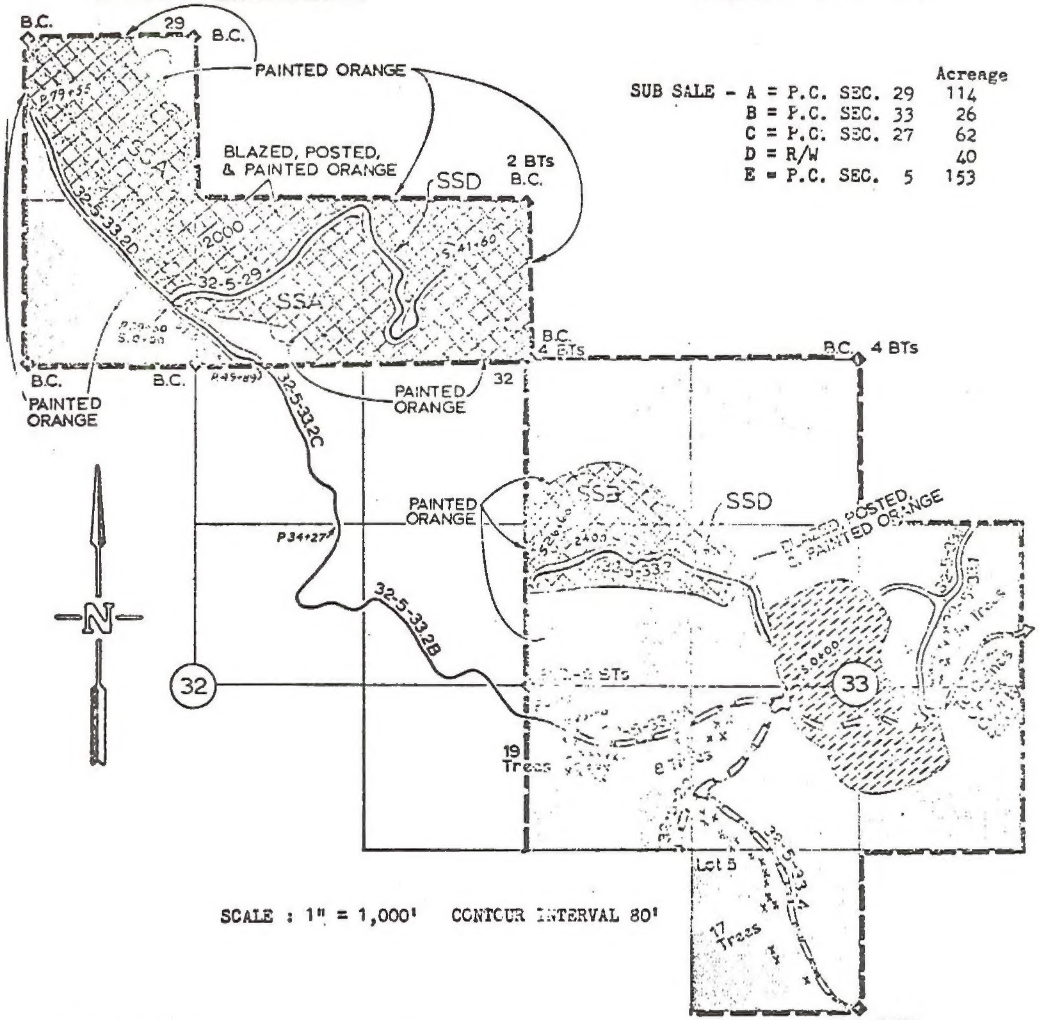
T. 32S., R.5W., SEC. 27, 29, 33.
T. 33S., R5W., SEC. 5 WILL MER

CONTRACT NO. 36110 - TS4 - 60

SALE NAME: WOODFORD CREEK

EXHIBIT A PAGE 1 OF 3

SUB SALE		Acreage
A	= P.C. SEC. 29	114
B	= P.C. SEC. 33	26
C	= P.C. SEC. 27	62
D	= R/W	40
E	= P.C. SEC. 5	153



SCALE : 1" = 1,000' CONTOUR INTERVAL 80'

☐ R/W AREA .... 40 Ac.

▨ RESERVE AREA .... 606 Ac.

▨ PARTIAL CUT AREA ...... 355 Ac.

☐ APPROX. AREA IN WHICH NO TREES ARE MARKED FOR CUTTING IN THE PARTIAL CUT AREA (15 Ac.)

xxxx APPROX. AREA IN WHICH TREES ARE MARKED FOR CUTTING IN THE RESERVE AREA.

▨ SPECIAL YARDING AREA. (320 Ac.)

▨ PREVIOUS SALE AREA. (RESERVE)

═══ EXISTING ROAD.

═══ ROAD TO BE IMPROVED.

─── ROAD TO BE CONSTRUCTED.

◆ FOUND CORNERS.

━ ━ ━ BOUNDARY OF CONTRACT AREA.

─── BOUNDARY OF CUTTING AREA.

+++++++ STREAM PROTECTION AREA.

TOTAL CONTRACT AREA 1001 Ac.

Appendix B

U.S.D.I. BLM MEDFORD DISTRICT SALE NO. 74-36.

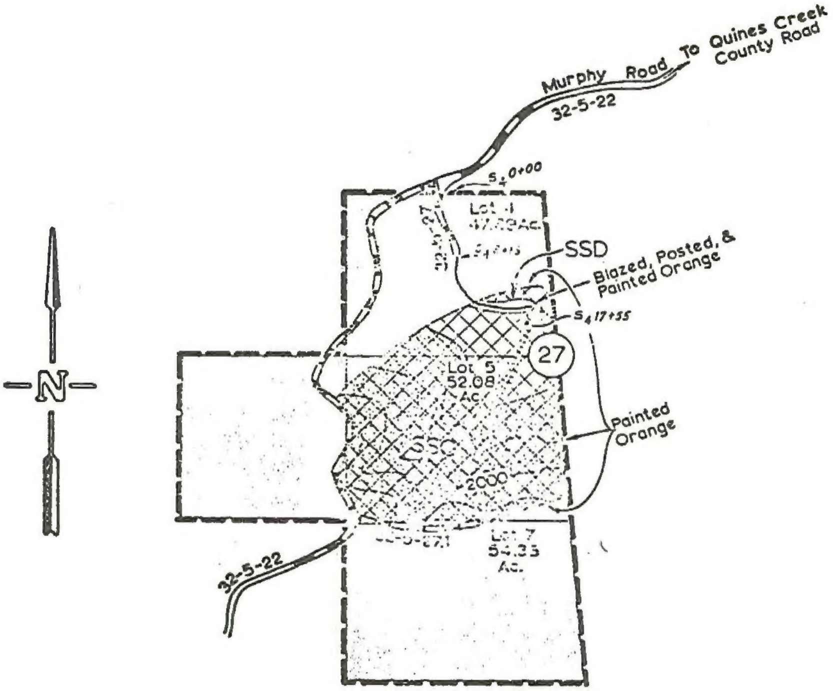
T.32S., R.5W., SEC. 27, 29, 33
T.33S., R5W. SEC. 5. WILL MER

SALE NAME: WOODFORD CREEK.

TIMBER SALE CONTRACT MAP.

CONTRACT NO. 36110 - TS4-60

EXHIBIT A PAGE 2 OF 3



SEE PAGE ONE FOR LEGEND.

Appendix B

U.S.D.I. BLM MEDFORD DISTRICT SALE NO. 74-36.

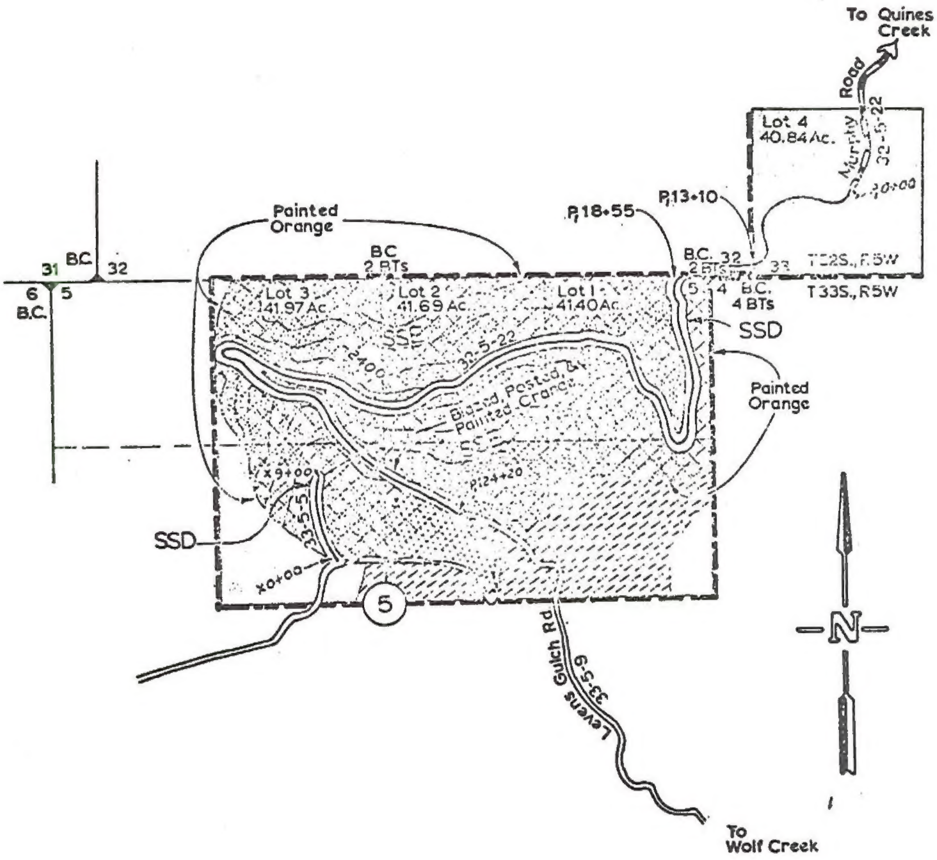
T.32S., R5W., SEC. 27, 29, 33
T.33S., R5W., SEC. 5, WILL MER

SALE NAME: WOODFORD CREEK.

TIMBER SALE CONTRACT MAP.

CONTRACT NO. 36110 - TS4-60

EXHIBIT A PAGE 3 OF 3



SEE PAGE ONE FOR LEGEND.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EXHIBIT B
LUMP SUM SALE

Contract No.
36110-TS4-60

The following estimates and calculations of value of timber sold are made solely as an administrative aid for determining: (1) adjustments made or credits given in accordance with Secs. 6, 9, or 11; (2) when payments are due; and (3) value of timber subject to any special bonding provisions. Except as provided in Sec. 2, Purchaser shall be liable for total purchase price even though quantity of timber actually cut or removed or designated for taking is less than the estimated volume or quantity shown. Cutting areas are shown on Exhibit A.

SPECIES	ESTIMATED VOLUME OR QUANTITY *(Units Specified)*	PRICE PER UNIT	AMOUNT OF ESTIMATED VOLUME OR QUANTITY × UNIT PRICE
Douglas-fir	7,554 M bd. ft.	$163.00	$1,231,302.00
Ponderosa Pine	23 M bd. ft.	116.55	2,680.65
White Fir	113 M bd. ft.	40.40	4,565.20
Western Hemlock	19 M bd. ft.	63.00	1,197.00
Incense-cedar	324 M bd. ft.	74.10	24,008.40
TOTALS	8,033 M bd. ft.		$1,263,753.25

The apportionment of the total purchase price is as follows:

Subsale A			
Douglas-fir	1,664 M bd. ft.	$163.00	$271,232.00
Ponderosa Pine	14 M bd. ft.	116.55	1,631.70
White Fir	27 M bd. ft.	40.40	1,090.80
Incense-cedar	88 M bd. ft.	74.10	6,520.80
	1,793 M bd. ft.		$280,475.30 ÷ 114 acres= $2,460.31 value per acre
Subsale B			
Douglas-fir	646 M bd. ft.	$163.00	$105,298.00
White Fir	18 M bd. ft.	40.40	727.20
	664 M bd. ft.		$106,025.20 ÷ 26 acres = $4,077.89 value per acre
Subsale C			
Douglas-fir	781 M bd. ft.	$163.00	$127,303.00
White Fir	22 M bd. ft.	40.40	888.80
Incense-cedar	54 M bd. ft.	74.10	4,001.40
	857 M bd. ft.		$132,193.20 ÷ 62 acres = $2,132.15 value per acre
Subsale D			
Douglas-fir	1,033 M bd. ft.	$163.00	$168,379.00
Ponderosa Pine	9 M bd. ft.	116.55	1,048.95
Western Hemlock	19 M bd. ft.	63.00	1,197.00
Incense-cedar	9 M bd. ft.	74.10	666.90
	1,070 M bd. ft.		$171,291.85 ÷ 40 acres = $4,282.30 value per acre
Subsale E			
Douglas-fir	3,430 M bd. ft.	$163.00	$559,090.00
White Fir	46 M bd. ft.	40.40	1,858.40
Incense-cedar	173 M bd. ft.	74.10	12,819.30
	3,649 M bd. ft.		$573,767.70 ÷ 153 acres = $3,750.12 value per acre

Appendix B

EXHIBIT C
Sheet 1 of 35

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

TIMBER SALE ROAD PLANS AND SPECIFICATIONS

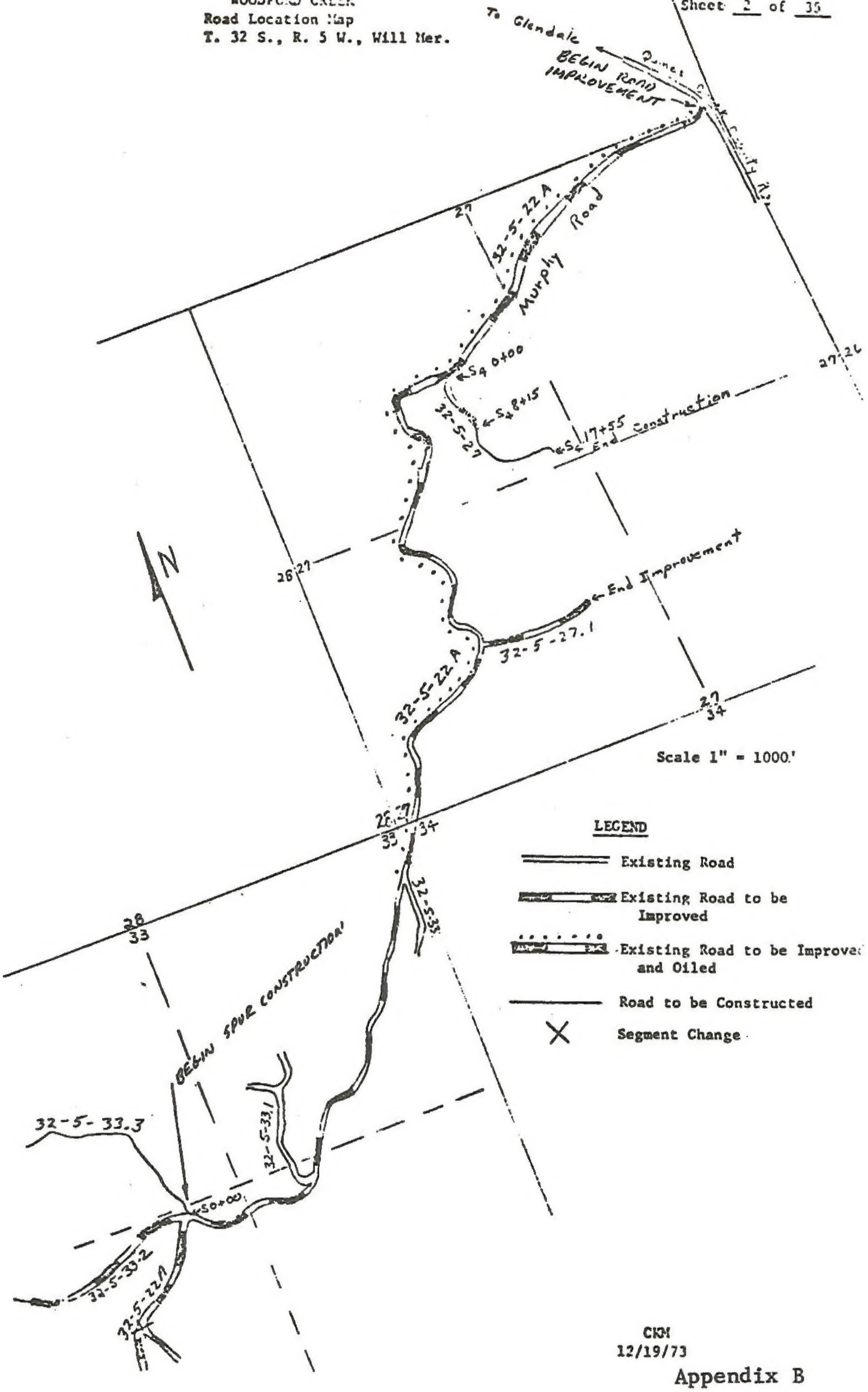
Woodford Creek Timber Sale

SPECIFICATION	SHEET NO.	SUBJECT
	2 & 3	Road Location Map
	4 & 5	Specification Sheet
	6-17	Plan and Profile
	18	Culvert List
100	19	General
200	20	Clearing and Grubbing
300	21	Grading
400	22	Corrugated Metal Culvert Pipe
600	23	Select Borrow Surfacing
900	24	Watering
1000	25	Renovation of Existing Roads
1300	26 & 27	Oil Dust Palliatives
	28	Special Provisions
	29	Rock Quarry Specifications
	30-31-32	Guide for use of Slope Stake Information
	33	Half-Round Culvert Installation
	34	Cross Drain Culvert Installation
	35	Water Dip Specifications

Appendix B

WOODFORD CREEK
Road Location Map
T. 32 S., R. 5 W., Will Mer.

EXHIBIT C
Sheet 2 of 35

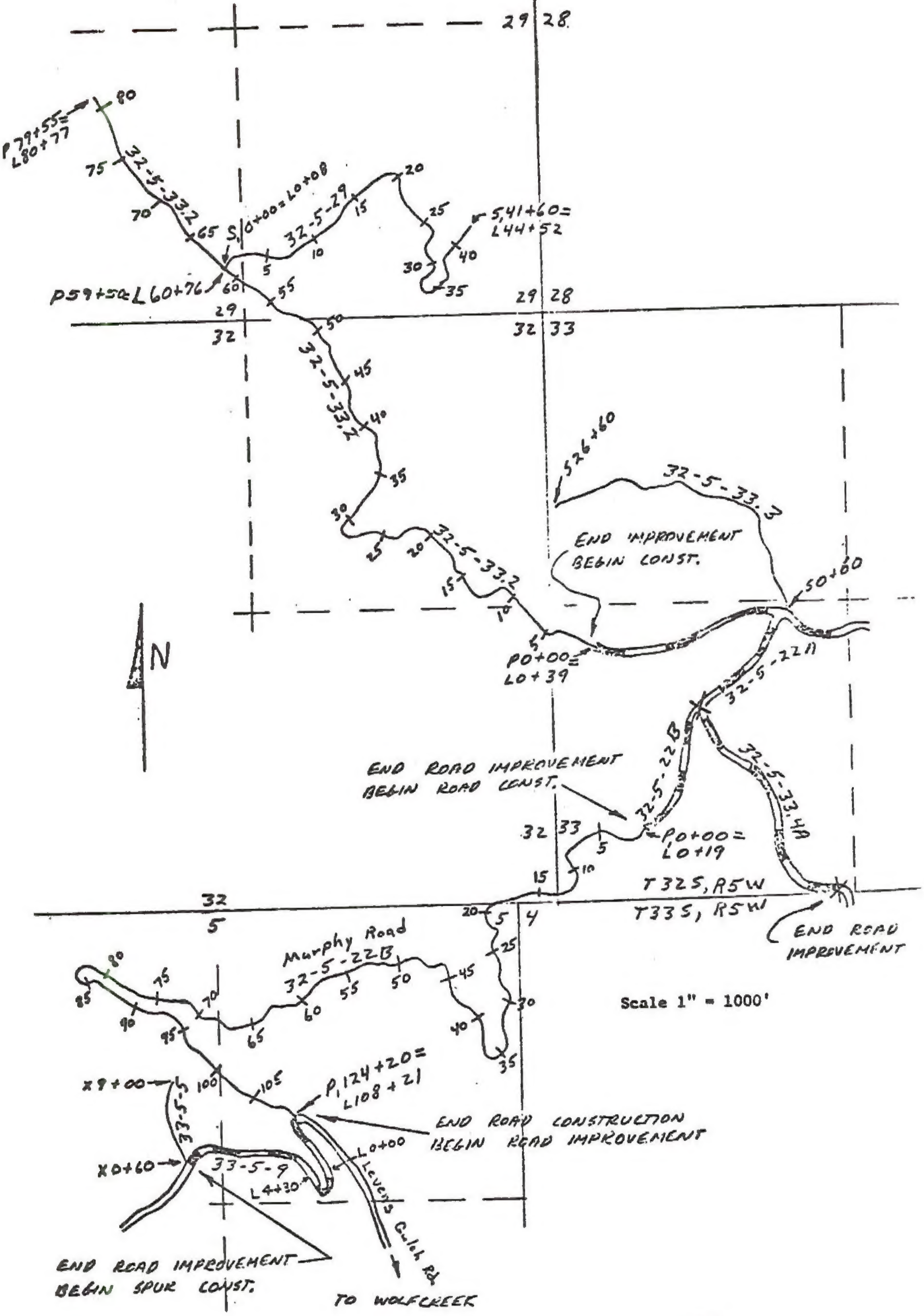


CKM
12/19/73

Appendix B

WOODFORD CREEK
Road Location Map
T. 32 S., R. 5 W.
T. 33 S., R. 5 W.

EXHIBIT C
Sheet 3 of 35



CKM
12/19/73

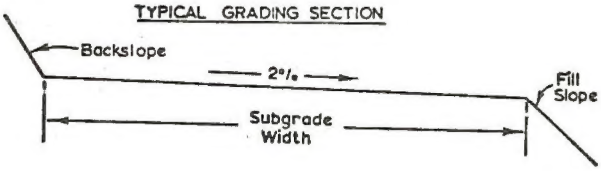
Appendix B

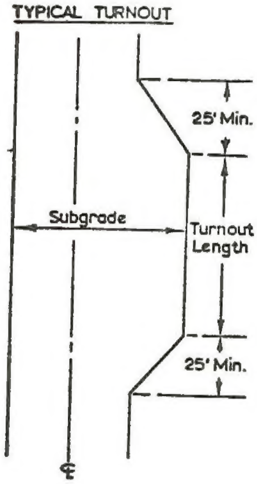
0-11-9110-26
Nov 1973

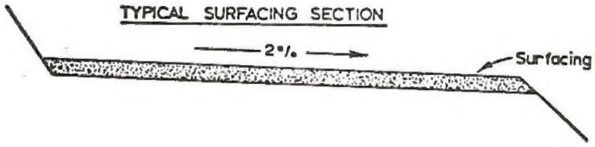
OUTSLOPE SPECIFICATION SHEET FOR UNDESIGNED SURFACED ROADS

EXHIBIT C
Sheet 4 of 35

Road No.	32-5-27	Station	32-5-29	~~to Station~~	32-5-33.3
Road No.	32-5-27.1	Station	33-5-5	~~to Station~~	32-5-33.2(L60+76
Road No.	32-5-221-3	Station	33-5-9	~~to Station~~	to L80+77)


TYPICAL GRADING SECTION


TYPICAL TURNOUT


TYPICAL SURFACING SECTION

	Rd. No.	Rd. No.	Rd. No.
	See above Road No.		
1. Road Standard	SN-16		
2. Alignment			
Max. degree of curve	80°	°	°
3. Road Width			
Subgrade	16 ft.	ft.	ft.
Turnout	26 ft.	ft.	ft.
4. Gradient			
Max. Favorable	15 %	%	%
Max. Adverse	12 %	%	%
5. Clearing Width			
Beyond Top of Cut	0 ft.	ft.	ft.
Beyond Toe of Fill	5 ft.	ft.	ft.
6. Surfacing			
Min. Width	12 ft.	ft.	ft.
Top Course	ft.	ft.	ft.
Base Course	ft.	ft.	ft.
Select borrow rock			
Compacted depth	8 in.	in.	in.
Crushed Base Rock			
Grading			
Compacted depth	in	in	in
Crushed surface rock			
Grading			
Compacted depth	in	in	in
7. Turnouts			
Length	75 ft.	ft.	ft.

Width - 10 ft. in addition to subgrade width, located approximately as shown on the Road Location Map, and intervisible.

Surfacing - 10 feet in addition to min. surface widths.

8. Drainage
Culverts - corrugated sheetmetal
Standard round 18 in. min. diam.
Other Water dips

9.

Grading	Back Slopes	Fill Slopes
Common	1/2 : 1	1½:1
Soft rock and shale	½:1	1 1/3:1
Solid rock	¼:1	Angle of repose

10. Extra subgrade widths
Add to each fill shoulder 1 ft. for fills 1-6 ft., 2 ft. for fills over 6 ft

Widen the inside shoulder of all curves as follows:

When degree of curve equals
7° - 21° - 1 ft
22° - 35° - 2 ft
36° - 48° - 3 ft
49° - 64° - 4 ft
65° - 80° - 5 ft

11. Full bench construction required on sideslopes exceeding 60%.

0-11-9110-2
Mar. 1970

CULVERT LIST

EXHIBIT C
Sheet 18 of 35

Woodford Creek Timber Sale

Station	Diameter	Length	Skew	1/2 Round	Gage	Remarks
Road #32-5-33.1						
L 2+59	18"	56'			16	
L 3+95	18"	38'			16	
L 7+67	18"	54'			16	
L 10+44	18"	60'			16	
L 14+45	18"	40'	30°		16	
L 17+16	18"	66'			16	
L 19+33	18"	92'			16	
L 22+42	18"	42'	30°		16	
L 33+23	18"	36'	30°	21"x20'	16	
L 38+25	18"	52'		21"x20'	16	
L 43+24	18"	40'		21"x20'	16	
L 50+80	18"	36'		21"x30'	16	
L 56+90	18"	48'	30°	21" x 20'	16	
L 60+76	18"	38'	30°		16	
Road # 32-5-27						
S_4 4+02	18"	36'			16	
S_4 10+30	18"	32'			16	
S_4 12+30	18"	32'			16	
Road # 32-5-33.B						
S 19+70	18"	32'		21" x 10'	16	
Road # 32-5-29						
L 38+69	18"	74'			16	
Road #32-5-22.B						
L 1+87	18"	30'			16	Extension on existing
L 12 60	48"	46'			12	CMP
L 16+11	18"	48'			16	
L 66+08	18"	32'	30°		16	
Totals	13"	1014'				
	48"	46'				
	21"	110' Half round				

Appendix B

Exhibit C
Sheet 19 of 35

ROAD SPECIFICATIONS

GENERAL - 100

101 - Definitions

Roadbed - At any particular stage of construction, the portion of a road between the intersections of side slopes and top.

Roadway - The portion of the road within limits of construction.,

Spalls - Flakes or chips of stone.

102 - When any work is to be specifically tested or approved, the Purchaser shall give the Authorized Officer timely notice of its readiness for inspection and of the date fixed for such inspection. The Authorized Officer will not unreasonably delay response to requests for inspection and approval. Written approval shall be required for all work to be tested or approved.

SPECIAL PROVISIONS

Select Borrow Surfacing

All surfacing will be processed through a rock crushing machine consisting of a jaw and cone, or equivalent, to assure reduction of all material to a maximum size of 2½" in its greatest dimension.

Oiling

Dust oil shall be applied on Road 32-5-22A between County Road and the saddle in Section 33 according to specifications shown on sheet 26 and 27 of Exhibit C.

Right-of-Way Slash Removal

All right-of-way slash shall be buried outside the road prism limits in areas designated by the Authorized Officer.

Restrictive Time for Installation of Culvert

Installation of the culvert at stations L 3+12, L 12+60 on Road #32-5-22B will be done between June 15 and October 1 of the same year.

Waste Material

All waste material from L 7+50 to L 18+00 on Road #32-5-29 shall be end hauled to a designated area as directed by the BLM Authorized Officer shown on sheet 8 of Exhibit C.

EXHIBIT C
Sheet 29 of 35

ROCK QUARRY SPECIFICATIONS

1. GENERAL

The Purchaser shall notify the Authorized Officer at least four (4) days prior to commencing quarry operations.

All local, state and Federal safety codes concerning quarrying operations, warning signs and traffic control shall be complied with.

If the Purchaser desires to use a rock source other than the designated source, he shall collect rock samples as described by the Authorized Officer and have them tested at an approved laboratory and complete a written quarry exploration, development and reclamation plan. The Purchaser shall obtain from the Authorized Officer written approval of test results and plans prior to the commencement of quarry exploration. All such activity shall be done in accordance with the plan.

A chemical toilet shall be placed at the quarry site prior to commencing operations and shall be maintained until crushing operations are complete.

2. QUARRY DEVELOPMENT

The quarry shall be developed in a manner which will provide access to the total estimated future volume of rock which will be removed from the site.

All material blasted or dislodged from the quarry walls shall be utilized or disposed of as directed by the Authorized Officer. If necessary, secondary blasting or other means shall be employed to reduce the quarried rock to a usable size.

All quarries or pits shall be excavated in benches. The bench sections shall not be greater than forty (40) feet in height and not less than twenty (20) feet in width.

3. DISPOSAL OF OVERBURDEN AND OTHER MATERIAL

Overburden, trees, stumps and logs shall be removed back from the edge of all working quarry faces for a distance of twenty (20) feet.

Overburden and/or reject material shall be piled in orderly piles as directed.

4. PIT CLEANUP

Upon completion of quarry operations, the quarry site shall be graded and shaped.

The quarry shall be drained by placement of outsloping as shown in the quarry development plan.

Appendix B

Exhibit C
Sheet 30 of 35

PURCHASER SLOPE STAKING

GENERAL

The Purchaser shall slope stake Roads No. 32-5-22B, 32-5-33.2, 32-5-29 and 33-5-9 (see sheets 6-14 and sheet 17) in accordance with the slope stake information furnished by the authorized officer and the following provisions.

Slope staking shall be completed in time to allow an adequate period for checking. The Purchaser shall submit a copy of the slope stake notes prior to approval. The completed staking must be approved in writing by the Authorized Officer prior to construction.

SLOPE STAKES

A slope stake shall be set on the cut side of the road or on the uphill side of a fill section.

In through cuts exceeding 15 feet in depth at centerline, both sides of the road shall be staked.

Stakes shall be set at a maximum interval of 80 feet on tangents and 50 feet on curves.

The slope stake shall be moved back to the reference stake location at time of staking. Slope stakes shall be of good quality and flagged with red ribbon.

REFERENCE STAKES

A reference stake or aluminum tag shall be set for each slope stake and shall be nailed to the base of a stump or tree whenever practicable. The stake shall be placed outside the posted right-of-way or outside the expected construction zone if the right-of-way is not posted.

GENERAL PROVISIONS

Slope stakes and reference stakes shall be set and marked according to the illustrations included in the exhibit on pages 31 & 32.

Slope and reference stakes shall be set to conform to the following standards of accuracy:

a. Maximum horizontal deviation from centerline ± 0.5 feet.

b. Maximum vertical deviation from centerline grade ± 0.5 feet.

The Purchaser shall provide all materials necessary to complete the project.

APPENDIX C

REVESTED OREGON AND CALIFORNIA RAILROAD AND RECONVEYED COOS BAY WAGON ROAD LANDS ACT OF 1937

(Public -No. 405-75th Congress)
(Chapter 876-1st Session)
(H.R. 7618)

AN ACT

Relating to the Revested Oregon and California Railroad and Reconveyed Coos Bay Wagon Road grant lands situated in the State of Oregon.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That notwithstanding any provisions in the Acts of June 9, 1916 (39 Stat. 218), and February 26, 1919, (40,Stat. 1179), as amended, such portions of the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands as are or may hereafter come under the jurisdiction of the Department of the Interior, which have heretofore or may hereafter be classified as timberlands, and power-site lands valuable for timber, shall be managed, except as provided in Section 3 hereof, for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities: Provided, That nothing herein shall be construed to interfere with the use and development of power sites as may be authorized by law.

The annual productive capacity for such lands shall be determined and declared as promptly as possible after the passage of this Act, but until such determination and declaration are made the average annual cut therefrom shall not exceed one-half billion feet board measure: Provided, That timber from said lands in an amount not less than one-half billion feet board measure, or not less than the annual sustained yield capacity when the same has been determined and declared, shall be sold annually or so much thereof as can be sold at reasonable prices on a normal market.

If the Secretary of the Interior determines that such action will facilitate sustained-yield management, he may subdivide such revested lands into sustained-yield forest units, the boundary lines of which shall be so established that a forest unit will provide, insofar as practicable, a permanent source of raw materials for the support of dependent communities and local industries of the region; but until such subdivision is made the land shall be treated as a single unit in applying the principle of sustained yield; Provided, That before the boundary lines of such forest units are established, the Department, after published notice thereof, shall hold a hearing thereon in the vicinity of such lands open to attendance of State and local officers, representatives of dependent industries, residents, and other persons interested in the use of such lands. Due consideration shall be given to established lumbering operations in subdividing such lands when necessary to protect the economic stability of dependent communities. Timber sales from a forest unit shall be limited to the productive capacity of such unit and the Secretary is authorized, in his discretion, to reject any bids which may interfere with the sustained-yield management plan of any unit.

Sec. 2. The Secretary of the Interior is authorized, in his discretion, to make cooperative agreements with other Federal or State forest administrative agencies or with private forest owners or operators for the coordinated administration, with respect to time, rate, method of cutting, and sustained yield, of forest units comprising parts of revested or reconveyed lands, together with lands in private ownership or under the administration of other public agencies, when by such agreements he may be aided in accomplishing the purposes hereinbefore mentioned.

Sec. 3. The Secretary of the Interior is authorized to classify, either on application or otherwise, and restore to homestead entry, or purchase under the provisions of section 14 of the Act of June 28, 1934, (48 Stat. 1269), any of such revested or reconveyed land which, in his judgment, is more suitable for agricultural use than for afforestation, reforestation, stream-flow protection, recreation, or other public purposes.

Any of said lands heretofore classified as agricultural may be reclassified as timber lands, if found, upon examination, to be more suitable for the production of trees than agricultural use, such reclassified timber lands to be managed for permanent forest production as herein provided.

Sec. 4. The Secretary of the Interior is authorized, in his discretion, to lease for grazing any of said revested or reconveyed lands which may be so used without interfering with the production of timber or other purposes of this Act as stated in section 1: Provided, That all the moneys received on account of grazing leases shall be covered either into the "Oregon and California land-grant fund" or the "Coos Bay Wagon Road grant fund" in the Treasury as the location of the leased lands shall determine, and be subject to distribution as other moneys in such funds: Provided further, That the Secretary is also authorized to formulate rules and regulations for the use, protection, improvement, and rehabilitation of such grazing lands.

Sec. 5. The Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this Act into full force and effect. The Secretary of the Interior is further authorized, in formulating forest-practice rules and regulations, to consult with the Oregon State Board of Forestry, representatives of timber owners and operators on or contiguous to said revested and reconveyed lands, and other persons or agencies interested in the use of such lands.

In formulating regulations for the protection of such timberlands against fire, the Secretary is authorized, in his discretion, to consult and advise with Federal, State, and county agencies engaged in forest-fire-protection work, and to make agreements with such agencies for the cooperative administration of fire regulations therein: Provided, That rules and regulations for the protection of the revested lands from fire shall conform with the requirements and practices of the State of Oregon insofar as the same are consistent with the interests of the United States.

TITLE II

That on and after March 1, 1938, all moneys deposited in the Treasury of the United States in the special fund designated the "Oregon and California land-grant fund" shall be distributed annually as follows:

(a) Fifty per centum to the counties in which the lands revested under the Act of June 9, 1916 (39 Stat. 218), are situated, to be payable on or after June 30, 1938, and each year thereafter to each of said counties in the proportion that the total assessed value of the Oregon and California grant lands in each of said counties for the year 1915 bears to the total assessed value of all of said lands in the State of Oregon for said year, such moneys to be used as other county funds.

(b) Twenty-five per centum to said counties as money in lieu of taxes accrued or which shall accrue to them prior to March 1, 1938, under the provisions of the Act of July 13, 1926 (44 Stat. 915), and which taxes are unpaid on said date, such moneys to be paid to said counties severally by the Secretary of the Treasury of the United States, upon certification by the Secretary of the Interior, until such tax indebtedness as shall have accrued prior to March 1, 1938, is extinguished.

From and after payment of the above accrued taxes said 25 per centum shall be accredited annually to the general fund in the Treasury of the United States until all reimbursable charges against the Oregon and California land-grant fund owing to the general fund in the Treasury have been paid: Provided, That if for any year after the extinguishment of the tax indebtedness accruing to the counties prior to March 1, 1938, under the provisions of Forty-fourth Statutes, page 915, the total amount payable under subsection (a) of this title is less than 78 per centum of the aggregate amount of tax claims which accrued to said counties under said Act for the year 1934, there shall be additionally payable for such year such portion of said 25 per centum (but not in excess of three-fifths of said 25 per centum), as may be necessary to make up the deficiency. When the general fund in the Treasury has been fully reimbursed for the expenditures which were made charges against the Oregon and California land-grant fund said 25 per centum shall be paid annually, on or after June 30, to the several counties in the manner provided in subsection (a) hereof.

(c) Twenty-five per centum to be available for the administration of this Act, in such annual amounts as the Congress shall from time to time determine. Any part of such per centum not used for administrative purposes shall be covered into the general fund of the Treasury of the United States: Provided, That moneys covered into the Treasury in such manner shall be used to satisfy the reimbursable charges against the Oregon and California land-grant fund mentioned in subsection (b) so long as any such charges shall exist.

All Acts or parts of Acts in conflict with this Act are hereby repealed to the extent necessary to give full force and effect to this Act.

Approved, August 28, 1937.

APPENDIX D

GUIDELINES FOR CLEARCUTTING
ON
FEDERAL TIMBERLANDS

Guidelines for Clear-cutting On Federal Timberlands
Abstracted From:
Clear-cutting On Federal Lands, Report by
The Subcommittee on Public Lands to the
Committee on Interior and Insular Affairs,
United States Senate
(March, 1972)

"Therefore, the Subcommittee believes timber management activities on Federal lands should be subject to the following policy guidelines:

1. Allowable harvest levels

a. Allowable harvest on Federal forest lands should be reviewed and adjusted periodically to assure that the lands on which they are based are available and suitable for timber production under these guidelines.

b. Increases in allowable harvests based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests, and there is assurance that such practices are satisfactorily funded for continuation to completion.

If planned intensive measures are inadequately funded and thus cannot be accomplished on schedule, allowable harvests should be reduced accordingly."

2. Harvesting limitations

Clear-cutting should not be used as a cutting method on Federal land areas where:

a. Soil, slope or other watershed conditions are fragile and subject to major injury.

b. There is no assurance that the area can be adequately restocked within five years after harvest.

c. Aesthetic values outweigh other considerations.

d. The method is preferred only because it will give the greatest dollar return or the greatest unit output.

3. Clear-cutting should be used only where:

a. It is determined to be silviculturally essential to accomplish the relevant forest management objectives.

b. The size of clear-cut blocks, patches or strips are kept at the minimum necessary to accomplish silvicultural and other multiple-use forest management objectives.

c. A multidisciplinary review has first been made of the potential environmental, biological, aesthetic, engineering and economic impacts on each sale area.

d. Clear-cut blocks, patches or strips are, in all cases, shaped and blended as much as possible with the natural terrain.

4. Timber sale contracts

Federal timber sale contracts should contain requirements to assure that all possible measures are taken to minimize or avoid adverse environmental impacts of timber harvesting, even if such measures result in lower net returns to the Treasury.

In Conclusion

The Subcommittee recommends that the Federal Government take prompt action toward bolstering the confidence and support of the American people for our nation's forestry program. The considerable testimony before the Subcommittee and the studies that have been completed or are now under way illustrate the necessity for establishing a prudent policy for regulating clear-cutting on our forest lands.

It is the hope of the Subcommittee that the guidelines it has set forth will be quickly adopted and implemented by the Executive Branch.

Appendix D

APPENDIX E

ENVIRONMENTAL ANALYSIS

I. Nonliving Components

A. Air

1. Air movement patterns
2. Temperature
3. Particulate matter
4. Carbon Monoxide
5. Hydrocarbons
6. Nitrogen Oxides
7. Sulfur Oxides
8. Radiological contaminants
9. Non Ionizing radiation

B. Land

1. Soil depth
2. Soil structure
3. Soil nutrient properties
4. Soil pollutants properties
5. Soil erosion
6. Geologic structure
7. Land use compatibility
8. Land use suitability

C. Water

1. Hydrologic cycle
2. Sediment load
3. Dissolved solids
4. Chemicals, heavy metals, and toxic substances
5. Nutrients
6. Solid debris
7. Coliform contamination
8. Acid balance (Ph)
9. Dissolved Oxygen
10. Temperature
11. Radiological contaminants

II. Living Components

  A. Plants (Aquatic)

    1. Vascular plants
    2. Phytoplankton
    3. Floating

  B. Plants (Terrestrial)

    1. Lichens and Mosses
    2. Grasses
    3. Forbs
    4. Shrubs
    5. Conifers
    6. Broadleaf trees

  C. Animals (Aquatic)

    1. Mammals
    2. Birds
    3. Amphibians and Reptiles
    4. Fish
    5. Invertebrates
    6. Zooplankton

  D. Animals (Terrestrial)

    1. Mammals
    2. Birds
    3. Reptiles
    4. Invertebrates (Insects)
    5. Man

III. Ecological Interrelationships

  A. Processes

    1. Succession
    2. Food relationships
    3. Community relationships

IV. Human Values

  A. Landscape Character

    1. The Harmonious
    2. The Accentuating

B. Sociocultural Interests

1. Educational/Scientific
2. Cultural values
3. Social welfare
4. Attitudes and expectations
5. Local regulatory structure

APPENDIX F

HISTORY OF: NATIONAL RESOURCE LANDS
ORGANIZATIONAL STRUCTURE
TIMBER MANAGEMENT PROGRAM

A. History of the National Resource Lands

The forest lands administered by the Bureau of Land Management fall into two principal categories: (1) the public domain lands extending throughout the western United States, including Alaska, and (2) the western Oregon lands composed primarily of the revested Oregon and California Railroad Grant Lands and the Reconveyed Coos Bay Wagon Road Lands, which together are usually referred to as the O&C lands. Since their legislative histories vary, each is discussed individually; however, they are collectively considered as national resource lands.

1. Public Domain Lands

During the 100 years after the United States became a nation, it was presented with an unparalleled opportunity for development through the acquistion of lands. Seven of the original states first ceded parts of their territories to the federal government. These cessions generally included those lands between the original states and the Mississippi River. Following this, the acquisition of the lands between the Mississippi River and the Pacific Ocean, and finally the acquisition of Alaska in 1867, provided the United States with a vast area of largely unsettled lands that in the main had not been committed to private ownership or use. 1/

The subsequent disposal of these lands to encourage settlement of the West was accomplished under the Homestead Act of 1862 and other authorities, which resulted in the granting or selling of approximately 1 billion acres to individuals, corporations and states. These lands were generally the most productive for resource and agricultural development and were located in the fertile valleys, plains, and low elevational areas. There were, of course, significant exceptions.

Beginning around 1900, the emphasis in public land policy began to shift toward the retention of some lands in federal ownership. Millions of acres of land were set aside to be held as national forests, national parks, or other conservation and management units. The policy of reservation of lands for parks and forest, however, did not halt large-scale disposals. Homesteading was still a means of transferring federal land into private ownership until the 1930's. But by this time most of the land suitable for farming under the existing conditions was in private ownership. The Taylor Grazing Act of 1934 brought the era of homesteading largely to an end. The lands that remained in the unappropriated and unreserved public domain, outside of those in Alaska, were mainly in the arid and semi-arid areas of the West. 1/

1/ Public Land Law Review Commission Report, One-Third of the Nations Lands, U.S. Government Printing Office, Washington, D.C., pg. 19.

Today, the public domain lands in federal ownership, together with additional areas of acquired lands, total nearly 755 million acres, one-third of the nation's land surface. Of this total, about 210 million acres of the public domain have been reserved as national parks and national forests under the administration of the National Park Service and Forest Service, respectively; and approximately 95 million acres have been set aside for other specific uses. The Bureau of Land Management is responsible for the administration of the approximately 470 million acres of the remaining public domain, representing over 60 percent of all federal lands. 1/

Approximately two-thirds of Bureau-administered lands are in Alaska; a large portion of these lands are subject to disposal to satisfy state and native claims. The Bureau estimates that from 80 to 100 million of these acres will be retained under Bureau administration following settlement of land claims under the Alaska Statehood Act and the Alaska Native Claims Settlement Act.

Public domain forest lands under the jurisdiction of the Bureau currently total about 21.7 million acres, are widely scattered, and are generally the residue left following the inclusion of the relatively higher-valued forest lands in the National Forest system. The remaining public domain is primarily comprised of grasslands, desert, tundra, and woodlands scattered throughout the western United States.

2. Western Oregon Lands

The western Oregon lands are mostly the remainder of grants issued for approximately 4 million acres of public domain land in the latter part of the 19th Century to corporations for the purpose of providing incentives for the construction of railroads and wagon roads. The major grant was to the Oregon and California Railroad Company and included odd-numbered sections (640 acres in size) of public domain land in a strip 40 miles wide along a proposed railroad line extending from the Columbia River, near Portland, to the California line. Because some of the odd-numbered sections within this strip had already passed to state and private ownership, the company was given the right to select the odd-numbered sections in a strip 10 miles wide on each side of the original strip. Another railroad grant was made to the Oregon Central Railroad Company, later absorbed by the Oregon and California Railroad Company, for alternate sections in a 40-mile-wide strip stretching from Portland to Astoria and McMinnville. For those lands not available for selection within the basic grant, the railroad was authorized to make alternate selections of odd-numbered sections from an indemnity strip 5 miles in width on each side of the basic grant. Another grant was also made to the state of Oregon for the construction of a wagon road from Coos Bay to Roseburg. This grant consisted of three alternate sections per mile in a strip extending three miles on either side of the proposed route and an additional indemnity grant extending three miles on either side of the initial place grant. The state transferred this grant to the Southern Oregon Company, its agent for construction of the road.

1/ Public Land Law Review Commission Report, One-Third of the Nations Lands, U.S. Government Printing Office, Washington, D.C., pg. 19.

These three grants, as amended, included a "settlers clause," as an accommodation to individual settlers, which set forth the terms which the grantees were required to follow in disposing of any of the granted lands. In 1915, the Supreme Court held that the terms of the clause had been violated but left to Congress the question of appropriate action. Congress responded by passing the 1916 O&C Revestment Act which returned 2,890,893 acres of the original railroad grants to the federal government. Three years later Congress passed a similar act returning 93,000 acres of the Coos Bay Wagon Road Grant.

Under these acts the revested acreage was to be classified as power site, timber, and agriculture with the provision that any timber harvested must be sold by competitive bid. Agricultural land, which included timber and power site land from which the timber was removed, was subject to homesteading. This was a continuation of the philosophy favoring agricultural development by means of public land disposal. Because of the high elevation, steep slopes and unsuitable soils for farming that characterize much of the revested lands, a negligible amount reverted to private ownership for homesteading purposes. The O&C Act of 1937, which included the Oregon and California Railroad and Coos Bay Wagon Road grant lands, specified that all revested and reconveyed lands, classified as timber land, would be managed for permanent timber production which, in effect, stabilized the tenure of the lands so classified. Today, these lands along with the intermingled public domain lands consist of approximately 2.4 million acres in a checkerboard pattern, the preponderance of which represent the highest timber-producing lands under the Bureau's administration and some of the most productive timber lands in the nation.

B. History of Organizational Structure

The Constitution of the United States gave Congress authority to administer the public domain lands. However, Congress was forced to look at the public domain as a source of revenues through land disposal actions since its financial resources were minimal and debts were high. In 1812 Congress established the General Land Office as part of the Treasury Department. The Land Office was authorized to survey, manage, and dispose of public domain lands primarily to encourage private settlement and development. Executive and administrative responsibilities were transferred from the Secretary of the Treasury to the Land Commissioner, with limited resource management authority. In 1849, the Department of the Interior was created. Originally called the Home Department, it was the sixth agency with cabinet status. The General Land Office, Office of Census, and Office of Indian Affairs were brought together in the new agency.

The passage of the Taylor Grazing Act in 1934 resulted in the creation of the Grazing Service within the Department of the Interior with administrative responsibility for the management of the public domain lands of western United States. Shortly afterwards in 1938, the Oregon and California Revested Land Administration was organized as a division of the General Land Office with administrative responsibility for revested lands in western Oregon, generally referred to as the O&C lands. In 1946, the General Land Office and the Grazing Service were combined into a new agency called the Bureau of Land Management under the Department of the Interior with administrative jurisdiction for both the public domain and O&C (Natural Resource Lands). With the end of World War II, there began a period of accelerating mobility of the American people and an increasing appreciation of the resource values of the public lands. To cope with the new situation, the Bureau began changing its structure, personnel and approaches.

Today, the Bureau has a total organization of approximately 5,000 people, most of which are located in offices in the western United States representing a variety of professional and non-professional disciplines. Professional foresters in conjunction with wildlife biologists, fisheries biologists, recreation specialists, hydrologists, soils specialists, economists and related professional expertise (15-20 percent of the workforce) are directly involved in the management of the forest lands under the Bureau's administration.

C. History of the Timber Management Program

In the early development of public lands, beginning in the latter part of the 18th Century, no special consideration was given to the trees on the land except for the reservation of small tracts of timber to be used for the construction of the Navy's sailing ships. Land was conveyed along with the timber to the settler, purchaser, or grantee who often considered the forest as a nuisance to agricultural development rather than as a valuable natural resource. The forest land remaining in public ownership was treated as a commons, and trees were taken as needed for housing and fuel.

With the increasing pace of industrialization and the growth of urban communities in the East, the public forests became increasingly attractive to large-scale, commercial exploitation and settlement. The taking of timber in trespass became increasingly large scale along with the emphasis on the rapid disposal of the lands. As the extent of the devastation of the great American forests became widely recognized, the future of the forests became a subject of public controversy. Congressional response was the Forest Reservation Act of 1891 which eventually led to the establishment of the National Forests, and other reservations (such as the National Parks) remained largely unmanaged and unprotected. Generally, the situation remained unchanged until the mid 1930's when the President reserved all remaining public lands outside of Alaska (about 200,000,000 acres) for classification and in connection with the development of national land-use policies. Specific authority with respect to timber, with the exception of the O&C lands, was generally limited to a few statutes authorizing free use of timber and authority to sell "dead-and-down" timber. A principle timber activity of the General Land Office was policing of timber trespass. Because of the small staff available for the work, the activity was largely limited to collecting damages for timber trespasses which could be discovered and traced.

It was not until the 1940's and 1950's that a concerted effort was made to utilize the timber resource found on the public lands. This period generally marked the beginning of the Bureau's current timber management program.

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